

**DRAFT ECONOMIC IMPACT ANALYSIS
OF PROPOSED CRITICAL HABITAT
FOR THREE ENDANGERED SPECIES
ON GUAM AND ROTA**

REVISED DETERMINATION

NOVEMBER 2002

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Acronyms and Abbreviations

°	degree
AAFB	Anderson Air Force Base
ABW	Air Base Wing
ac	acre
ACOE	Army Corps of Engineers
Act	Endangered Species Act of 1973
Air Force	U.S. Air Force
APC	areas of particular concern
BRAC	Base Realignment and Closure
C	Celsius
CATEX	categorical exclusion
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CLTC	Chamorro Land Trust Commission
cm	centimeters
CNMI	Commonwealth of the Northern Mariana Islands
COMNAVMARIANAS	Commander, U.S. Naval Forces Marianas
CRM	Coastal Resources Management
CZM	Coastal Zone Management
DAWR	Division of Aquatic and Wildlife Resources
DFW	Division of Fish and Wildlife
DLM	Department of Land Management
DLNR	Department of Lands and Natural Resources
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESQD	explosive safety quantity distance
F	Fahrenheit

FAA	Federal Aviation Administration
FHWA	Federal Highways Administration
ft	foot
FR	Federal Register
GDA	Guam Department of Agriculture
GEPA	Guam Environmental Protection Agency
GIP	Gross Island Product
GIS	Geographic Information System
GLUC	Guam Land Use Commission
GLUP	Guam Land Use Plan
GovGuam	Government of Guam
GSPC	Guam Seashore Protection Commission
ha	hectare
HCP	Habitat Conservation Plan
IEc	Industrial Economics, Inc.
in	inch
INRMP	Integrated Natural Resources Management Plan
KAL	Korean Air Lines
KD	known distance
km	kilometer
kph	kilometers per hour
m	meter
Marine Corps	U.S. Marine Corps
mi	mile
mm	millimeter
mph	miles per hour
MOUT	Military Operations on Urbanized Terrain
MPLT	Marianas Public Land Trust
MPPCL	Master Plan for Park and Conservation Land
MRP	Marine Resources Preserve

MSA	munitions storage area
NA	not applicable
Navy	U.S. Department of the Navy
NCTAMS	Naval Computer Telecommunications Area Master Station
NEPA	National Environmental Protection Agency
O&M	operation and maintenance
PACDIV	Pacific Division, Naval Facilities Engineering Command
PFW	Partners for Fish and Wildlife
P.L.	Public Law
ROD	Record of Decision
SAIA	Sikes Act Improvements Act
SDZ	surface danger zone
Service	U.S. Fish and Wildlife Service
U.S.	United States
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service

FOREWORD

CONTENT AND PURPOSE

This report assesses the economic impacts that may result from the designation of critical habitat for three endangered species in the U.S. Territory of Guam and the island of Rota, Commonwealth of the Northern Mariana Islands (CNMI). It was prepared for the U.S. Fish and Wildlife Service (Service) to help them in their decision regarding designating critical habitat for three endangered species.

As required by the Endangered Species Act of 1973, as amended (the Act), the decision to designate a particular area as critical habitat must take into account the potential economic impact of the critical habitat designation. If the economic analysis reveals that the economic impacts of designating any area as critical habitat outweigh the benefits of designation, the Service may exclude the area from consideration, unless the exclusion would lead to the extinction of the species.

The focus of the economic analysis is on section 7(a)(2) of the Act, which requires consultation with the Service, and possible project modification for certain projects and activities that may affect a species listed as threatened or endangered, or the habitat of a listed species. The consultations and possible project modifications will have economic impacts which, in this report, are referred to as “section 7 economic impacts” to distinguish them from the economic impacts related to other sections of the Act. Other sections of the Act are outside the scope of this economic analysis.

ORGANIZATION

This report is organized into six chapters:

- **Chapter 1: Listed Species and Proposed Critical Habitat.** This chapter provides relevant information on the animal species and the proposed critical habitat units.
- **Chapter 2: Physical and Socioeconomic Profile of Guam and Rota.** To provide the context for evaluating the economic impacts of the proposed critical habitat designation, this chapter presents a physical description of the islands of Guam and Rota, and the socioeconomic profile of each.
- **Chapter 3: The Endangered Species Act.** Relevant information from the Act is presented in this chapter, including the role of critical habitat designation in protecting threatened and endangered species, requirements for consulting with the Service, and the definition of taking and other restrictions.
- **Chapter 4: Existing Protections.** This chapter presents information on existing regulations and land management policies that protect wildlife species or their habitats.
- **Chapter 5: Economic Analysis Approach.** This chapter gives the general approach used to estimate section 7 economic impacts of the species listing and the proposed critical habitat designation.

- **Chapter 6: Economic Costs and Benefits.** This chapter discusses planned projects, activities and land uses in the proposed critical habitat units and estimates section 7 economic costs and benefits. It also describes the potential effects that may be attributable solely to the critical habitat provisions of section 7.

After learning about the proposed critical habitat (Chapter 1), readers who are already familiar with Guam and Rota (Chapter 2), the Act (Chapter 3), existing protections (Chapter 4), or the approach to conducting the economic analysis (Chapter 5) may wish to skip these chapters, as appropriate, and proceed to the economic analysis (Chapter 6).

TERMINOLOGY

The following Service terminology is *italicized* throughout this document for the benefit of readers who are unfamiliar with it and want to be reminded that the Service has given specific meanings to these words and terms: *Federal involvement*, *Federal nexus*, *occupied*, *unoccupied*, *primary constituent elements*, *jeopardy*, *adverse modification*, and *take*. The terms are explained in the body of the report.

ECONOMIC CONSULTANTS

The analysis was performed by Belt Collins Hawaii Ltd., based in Honolulu, Hawai‘i, under subcontract to Industrial Economics, Inc. (IEc), an economic consulting firm in Cambridge, Massachusetts. In conducting the analysis, Belt Collins worked in Hawai‘i, Guam, and Rota with the Service, and with Guam and Rota government agencies, companies, and organizations listed in Chapter 7, References.

PREFACE

The U.S. Fish and Wildlife Service has added this preface to all economic analyses of critical habitat designations:

"The standard best practice in economic analysis is applying an approach that measures costs, benefits, and other impacts arising from a regulatory action against a baseline scenario of the world without the regulation. Guidelines on economic analysis, developed in accordance with the recommendations set forth in Executive Order 12866 ("Regulatory Planning and Review"), for both the Office of Management and Budget and the Department of the Interior, note the appropriateness of the approach:

'The baseline is the state of the world that would exist without the proposed action. All costs and benefits that are included in the analysis should be incremental with respect to this baseline.'

"When viewed in this way the economic impacts of critical habitat designation involve evaluating the 'without critical habitat' baseline versus the 'with critical habitat' scenario. Impacts of a designation equal the difference, or the increment, between these two scenarios. Measured differences between the baseline and the scenario in which critical habitat is designated may include (but are not limited to) changes in land use, environmental quality, property values, or time and effort expended on consultations and other activities by Federal landowners, Federal action agencies, and in some instances, State and local governments and/or private third parties. Incremental changes may be either positive (benefits) or negative (costs).

"In *New Mexico Cattle Growers Ass'n v. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001), however, the 10th Circuit recently held that the baseline approach to economic analysis of critical habitat designations that was used by the Service for the southwestern willow flycatcher designation was 'not in accord with the language or intent of the ESA.' In particular, the court was concerned that the Service had failed to analyze any economic impact that would result from the designation, because it took the position in the economic analysis that there was no economic impact from critical habitat that was incremental to, rather than merely co-extensive with, the economic impact of listing the species. The Service had therefore assigned all of the possible impacts of designation to the listing of the species, without acknowledging any uncertainty in this conclusion or considering such potential impacts as transaction costs, reinitiations, or indirect costs. The court rejected the baseline approach incorporated in that designation, concluding that, by obviating the need to perform any analysis of economic impacts, such an approach rendered the economic analysis requirement meaningless: 'The statutory language is plain in requiring some kind of consideration of economic impact in the CHD phase.'

"In this analysis, the Service addresses the 10th Circuit's concern that we give meaning to the ESA's requirement of considering the economic impacts of designation by acknowledging the uncertainty of assigning certain post-designation economic impacts (particularly section 7 consultations) as having resulted from either the listing or the designation. The Service believes that for many species the designation of critical habitat has a relatively small economic impact, particularly in areas where consultations have been ongoing with respect to the species. This is because the majority of the

consultations and associated project modifications, if any, already consider habitat impacts and as a result, the process is not likely to change due to the designation of critical habitat. Nevertheless, we recognize that the nationwide history of consultations on critical habitat is not broad, and, in any particular case, there may be considerable uncertainty whether an impact is due to the critical habitat designation or the listing alone. We also understand that the public wants to know more about the kinds of costs consultations impose and frequently believe that designation could require additional project modifications.

"Therefore, this analysis analyzes the impacts of critical habitat designation that may be 'attributable co-extensively' to the listing of the species. Because of the potential uncertainty about the benefits and economic costs resulting from critical habitat designations, we believe it is reasonable to estimate the effects of the designation utilizing this approach to avoid understating potential economic effects. It is important to note that the inclusion of impacts attributable co-extensively to the listing does not convert the economic analysis into a tool to be considered in the context of a listing decision. As the court reaffirmed in the southwestern willow flycatcher decision, 'the ESA clearly bars economic considerations from having a seat at the table when the listing determination is being made.'

DATED: October 22, 2002

EXECUTIVE SUMMARY

INTRODUCTION

The purpose of this report is to identify and analyze the potential economic impacts that would result from the proposed critical habitat designation for three endangered species in the U.S. Territory of Guam and the island of Rota, Commonwealth of the Northern Mariana Islands (CNMI). Section 4(b)(2) of the Endangered Species Act of 1973, as amended (the Act), requires the U.S. Department of the Interior, Fish and Wildlife Service (Service) to designate critical habitat on the basis of the best scientific and commercial data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation if the benefits of exclusion outweigh the benefits of designation, provided the exclusion will not result in extinction of the species.

The basis of this economic analysis is provided by section 7(a)(2) of the Act, which requires Federal agencies to ensure that any action authorized, funded, or carried out by the Federal government is not likely to *jeopardize* the continued existence of any threatened or endangered species or result in the destruction or *adverse modification* of critical habitat. Federal agencies are required to consult with the Service whenever they propose a discretionary action that may affect a listed species or its designated critical habitat. Aside from the protection that is provided under section 7, the Act does not provide other forms of protection that apply directly to lands designated as critical habitat. Because consultation under section 7 only applies to activities that involve Federal permits, funding or involvement, the designation of critical habitat will not afford any additional protections under the Act with respect to strictly private activities. This analysis does not address impacts associated with implementation of other sections of the Act.

PROPOSED CRITICAL HABITAT DESIGNATION

The Service is proposing to designate critical habitat for the Mariana fruit bat, the Guam Micronesian kingfisher, and the Mariana crow. On the island of Guam, critical habitat is being proposed in two separate units: Units A and B. In total, these two units encompass 24,802 acres (ac) (10,037 ha). On the island of Rota, critical habitat is being proposed for the Mariana crow. This third unit, Unit C, encompasses 6,084 ac (2,462 ha).¹

¹ This acreage estimate overstates the actual critical habitat acreage, because it includes “unmapped holes,” and other smaller man-made structures and features discussed in Chapter 1.

ECONOMIC IMPACTS AND BENEFITS

The estimated total section 7-related cost associated with species listing is \$1,573,605. Of this amount, \$554,375, or 35 percent, is estimated to be solely attributable to the designation of proposed critical habitat. Summaries by island are presented below.

Guam

The estimated total section 7-related cost associated with species listing on Guam is \$1,424,185. Of this amount, \$533,655, or 38 percent, is estimated to be solely attributable to the designation of critical habitat. These costs represent only 0.07 percent of the total personal income of Guam in 1999. Specific cost information follows:

- The greatest impact is estimated to occur on Navy projects, with \$474,390, or 62 percent, of the total section 7 cost of \$770,790 attributable to the designation of critical habitat. Approximately 34 percent of proposed critical habitat on Guam is owned by the Navy.
- Approximately \$23,515, or nine percent, of the total section 7 cost of \$262,465 is attributable to the designation of critical habitat on Air Force property. Approximately 44 percent of proposed critical habitat on Guam is owned by the Air Force.
- No economic impact is identified on Government of Guam (GovGuam) properties, as these lack the *Federal nexus* needed for section 7 consultation. Approximately 12 percent of proposed critical habitat on Guam is owned by GovGuam.
- Approximately \$35,750, or nine percent, of the total section 7 cost of \$390,930 is attributable to critical habitat designation on privately held lands. While these costs are relatively small, any additional economic impact could be substantial for an individual landowner. Approximately seven percent of proposed critical habitat on Guam is privately owned.
- Indirect costs associated with the designation of proposed critical habitat have not been quantified, but the indirect effect of project delays discussed in Section 6.3 could amount to hundreds of thousands of dollars per project.

Benefits from proposed critical habitat have not been quantified but could occur in the form of direct or species-specific benefits and indirect or ecosystem-wide benefits. Such benefits could include:

- Species preservation and recovery, the primary goal of the Act, as well as other complementary ecological improvements may generate social welfare benefits. However, species-specific benefits can only be realized with the control of the brown treesnake. Without effective reduction and control of the brown treesnake on Guam, the Mariana crow, Guam Micronesian kingfisher, and Mariana fruit bat will not be able to survive and no species-specific benefit would occur from proposed critical habitat.
- Indirect benefits of critical habitat designation could include increased recreation, overall ecosystem health, and ecosystem preservation. Additional conservation management activities funded by Federal sources could occur and result in a local increase in revenues and employment.

The development of quantitative estimates associated with the benefits of the proposed designation is impeded by the lack of available studies and information relating to the size and value of

beneficial changes that are likely to occur as a result of listing a species or designating critical habitat.

Rota

The estimated total section 7-related cost associated with species listing on Rota is \$149,420. Of this amount, \$20,720, or 14 percent, is estimated to be solely attributable to the designation of critical habitat. These costs represent only 0.4 percent of the total personal income of Rota in 1999. Specific cost information follows:

- The greatest impact is estimated to occur on projects on CNMI public land where \$20,720, or 14 percent, of the total section 7 cost of \$149,420 is attributable to the designation of critical habitat. Approximately 92 percent of proposed critical habitat on Rota is publically owned.
- No economic impact is identified on privately owned properties, as these lack the *Federal nexus* needed for section 7 consultation. Approximately eight percent of proposed critical habitat on Rota is privately owned.
- Indirect costs have not been quantified, but the indirect effect of designation, discussed in Section 6.3, could result in adverse impact on the survival of the Mariana crow.

Benefits from proposed critical habitat have not been quantified but could occur in the form of direct or species-specific benefits and indirect or ecosystem-wide benefits. Such benefits could include:

- Species preservation and other complementary ecological improvements may generate social welfare benefits.
- Indirect benefits of critical habitat designation could include increased recreation, overall ecosystem health, and ecosystem preservation. Additional conservation management activities funded by Federal sources could occur and result in a local increase in revenues and employment.

The development of quantitative estimates associated with the benefits of the proposed designation is impeded by the lack of available studies and information relating to the size and value of beneficial changes that are likely to occur as a result of listing a species or designating critical habitat.

ES-1: Section 7 Costs and Benefits Attributable to Species Listings and Proposed Critical Habitat
(10-year estimates)

Item	Consultation		Project Modification		Consultation + PM		CH Acreage	Explanation
	Total	Share to CH	Total	Share to CH	Total	Share to CH		
DIRECT SECTION 7 -RELATED COSTS								
Guam								
U.S. Navy								
Existing Activities/Projects Approved in Marianas Training EIS/Handbook	\$130,350	\$130,350	\$312,500	\$312,500	\$442,850	\$442,850	19,394 ac	
New Activities/Projects Approved in Marianas Training EIS/Handbook								
Sniper Firing Range	\$1,900	\$1,900	\$0	\$0	\$1,900	\$1,900	ne	
Jungle Trail	\$4,180	\$380	None	None	\$4,180	\$380	0.09 ac	
Potential Activities/Projects Not Addressed in Marianas Training EIS/Handbook	\$51,810	\$4,710	\$126,500	\$11,500	\$178,310	\$16,210	8,442 ac	
Potential Activities/Projects Not Covered Above	\$132,550	\$12,050	\$11,000	\$1,000	\$143,550	\$13,050	8,442 ac	
Subtotal - U.S. Navy	\$320,790	\$149,390	\$450,000	\$325,000	\$770,790	\$474,390		
Percentage of Share to CH		46.6%		72.2%		61.5%		
U.S. Air Force								
Potential Activity/Project - On-Base Water Supply Improvements	\$41,690	\$3,790	None	None	\$41,690	\$3,790	unknown	
Potential Activity/Project - MSA Bunker Upgrade	\$3,800	\$0	None	None	\$3,800	\$0	1,650 ac	
Potential Activity/Project - Brown Treesnake Barrier Around the MSA	\$4,180	\$380	None	None	\$4,180	\$380	1,650 ac	
Potential Activity/Project - Weapons Storage Building in the MSA	\$23,650	\$2,150	None	None	\$23,650	\$2,150	1,650 ac	
Other Potential Activities/Projects	\$189,145	\$17,195	None	None	\$189,145	\$17,195	unknown	
Subtotal - U.S. Air Force	\$262,465	\$23,515	None	None	\$262,465	\$23,515		

ES-1: Section 7 Costs and Benefits Attributable to Species Listings and Proposed Critical Habitat
(10-year estimates)

Item	Consultation		Project Modification		Consultation + PM		CH Acreage	Explanation
	Total	Share to CH	Total	Share to CH	Total	Share to CH		
Percentage of Share to CH		9.0%				9.0%		
GovGuam								
Potential Activity/Project - Former FAA Housing Parcel	None	None	None	None	None	None	140 ac	Development on the parcel will not involve Federal permits/funding
Northern Guam Public Land	None	None	None	None	None	None	1416 ac	Until the status of the lands is resolved, no actions that would involve section 7 consultation are anticipated
Southern Guam Public Land	None	None	None	None	None	None	1,355 ac (tentative)	Until the status of the lands is resolved, no actions that would involve section 7 consultation are anticipated
Subtotal - GovGuam	\$0	\$0	\$0	\$0	\$0	\$0		
Percentage of Share to CH		NA		NA		NA		
Private Land								
Potential Activity/Project - Beach-Oriented Recreation for Tourists Northwest of Unit A	\$23,870	\$2,170	\$110,000	\$10,000	\$133,870	\$12,170	40 ac	
Potential Activity/Project - Beach-Oriented Recreation for Tourists Northeast of Unit A	\$52,910	\$4,810	\$155,100	\$14,100	\$208,010	\$18,910	12 ac	
Potential Activity/Project - Eco-Tourism and Adventure Racing in the Southern Part of Unit B	\$25,850	\$2,350	\$23,200	\$2,320	\$49,050	\$4,670	453 ac	
Subtotal - Private Land	\$102,630	\$9,330	\$288,300	\$26,420	\$390,930	\$35,750		
Percentage of Share to CH		9.1%		9.2%		9.1%		
Guam Subtotal	\$685,885	\$182,235	\$738,300	\$351,420	\$1,424,185	\$533,655		
Percentage of Share to CH		26.6%		47.6%		37.5%		

ES-1: Section 7 Costs and Benefits Attributable to Species Listings and Proposed Critical Habitat
(10-year estimates)

Item	Consultation		Project Modification		Consultation + PM		CH Acreage	Explanation
	Total	Share to CH	Total	Share to CH	Total	Share to CH		
Rota								
CNMI Public Lands								
Potential Activity/Project - Airport Improvements	\$25,850	\$2,350	\$85,800	\$7,800	\$111,650	\$10,150	None	Rota International Airport is physically outside proposed critical habitat
Potential Activity/Project - Route 100 Improvements	\$7,850	\$7,850	None	None	\$7,850	\$7,850	6 ac	
Potential Activity/Project - Marianas Agupa Golf Course	None	None	None	None	None	None	360 ac	<i>Federal nexus</i> has not been identified, so section 7 consultation is not appropriate
Potential Activity/Project - Solid Waste Landfill	\$29,920	\$2,720	None	None	\$29,920	\$2,720	20 ac	
Potential Activity/Project - Homesteads Program	None	None	None	None	None	None	247 ac	<i>Federal nexus</i> has not been identified, so section 7 consultation is not appropriate
Subtotal - CNMI Public Lands	\$63,620	\$12,920	\$85,800	\$7,800	\$149,420	\$20,720		
Percentage of Share to CH		20.3%		9.1%		13.9%		
Private Lands								
Potential Activity/Project - Activities on Privately Held Agricultural Homesteads	None	None	None	None	None	None	418 ac (currently held)	<i>Federal nexus</i> has not been identified, so section 7 consultation is not appropriate
Subtotal - Private Land	\$0	\$0	\$0	\$0	\$0	\$0		
Percentage of Share to CH		NA		NA		NA		
Rota Subtotal	\$63,620	\$12,920	\$85,800	\$7,800	\$149,420	\$20,720		
Percentage of Share to CH		20.3%		9.1%		13.9%		

ES-1: Section 7 Costs and Benefits Attributable to Species Listings and Proposed Critical Habitat
(10-year estimates)

Item	Consultation		Project Modification		Consultation + PM		CH Acreage	Explanation
	Total	Share to CH	Total	Share to CH	Total	Share to CH		
INDIRECT COSTS								
Guam								
U.S. Navy								
Natural Resources Management	ne	ne	ne	ne	ne	ne		Unquantified changes in budgeting and the relationship between the Navy and the Service
Military Training	ne	ne	ne	ne	ne	ne		Non quantifiable changes in training activities that lead to inefficient training or more expensive alternative
Subtotal - U.S. Navy	\$0	\$0	\$0	\$0	\$0	\$0		
Percentage of Share to CH		NA		NA		ne		
U.S. Air Force	ne	ne	ne	ne	ne	ne		Unquantified changes to training activities due to constraints of CH
Subtotal - U.S. Air Force	\$0	\$0	\$0	\$0	\$0	\$0		
Percentage of Share to CH		NA		NA		NA		
GovGuam	None	None	None	None	None	None		
Private Lands	ne	ne	ne	ne	ne	ne		Unquantified increased negative sentiment toward Federal government due to additional Federal control of Guam lands, which could be hundreds of thousands of dollars per project
Guam Subtotal	\$0	\$0	\$0	\$0	\$0	\$0		
Rota								
Additional Coastal Resources Management Office Requirements	ne	ne	ne	ne	ne	ne		Possible increase in the number of Minor Permit projects
Negative Public Reaction to Critical Habitat for the Mariana Crow	ne	ne	ne	ne	ne	ne		Public response to critical habitat may have unquantifiable adverse consequences on the survival of the species

ES-1: Section 7 Costs and Benefits Attributable to Species Listings and Proposed Critical Habitat
(10-year estimates)

Item	Consultation		Project Modification		Consultation + PM		CH Acreage	Explanation
	Total	Share to CH	Total	Share to CH	Total	Share to CH		
Conflicting Goals of the MPLA with Proposed Critical Habitat	ne	ne	ne	ne	ne	ne		Estimated revenue lost due to anticipated permit requirements is dependent on unquantifiable future development
Rota Subtotal	\$0	\$0	\$0	\$0	\$0	\$0		
DIRECT BENEFITS								
Species-Specific Benefits Associated with Ecosystem Change	ne	ne	ne	ne	ne	ne		Use value (such as wildlife viewing opportunities) and species existence value are not quantifiable
INDIRECT BENEFITS								
Ecosystem-Wide Benefits Associated with Section 7 Implementation	ne	ne	ne	ne	ne	ne		Benefits such as increased recreation, overall ecosystem health, ecosystem preservation, and other benefits are not quantifiable
TOTAL								
Costs Over 10 Years	\$749,505	\$195,155	\$824,100	\$359,220	\$1,573,605	\$554,375		
Percentage of Share to CH		26.0%		43.6%		35.2%		
Benefits Over 10 Years	\$0	\$0	\$0	\$0	\$0	\$0		Difficult to estimate

CH=Critical Habitat NA=Not Applicable ne=not estimated PM=Project Modifications

CHAPTER 1

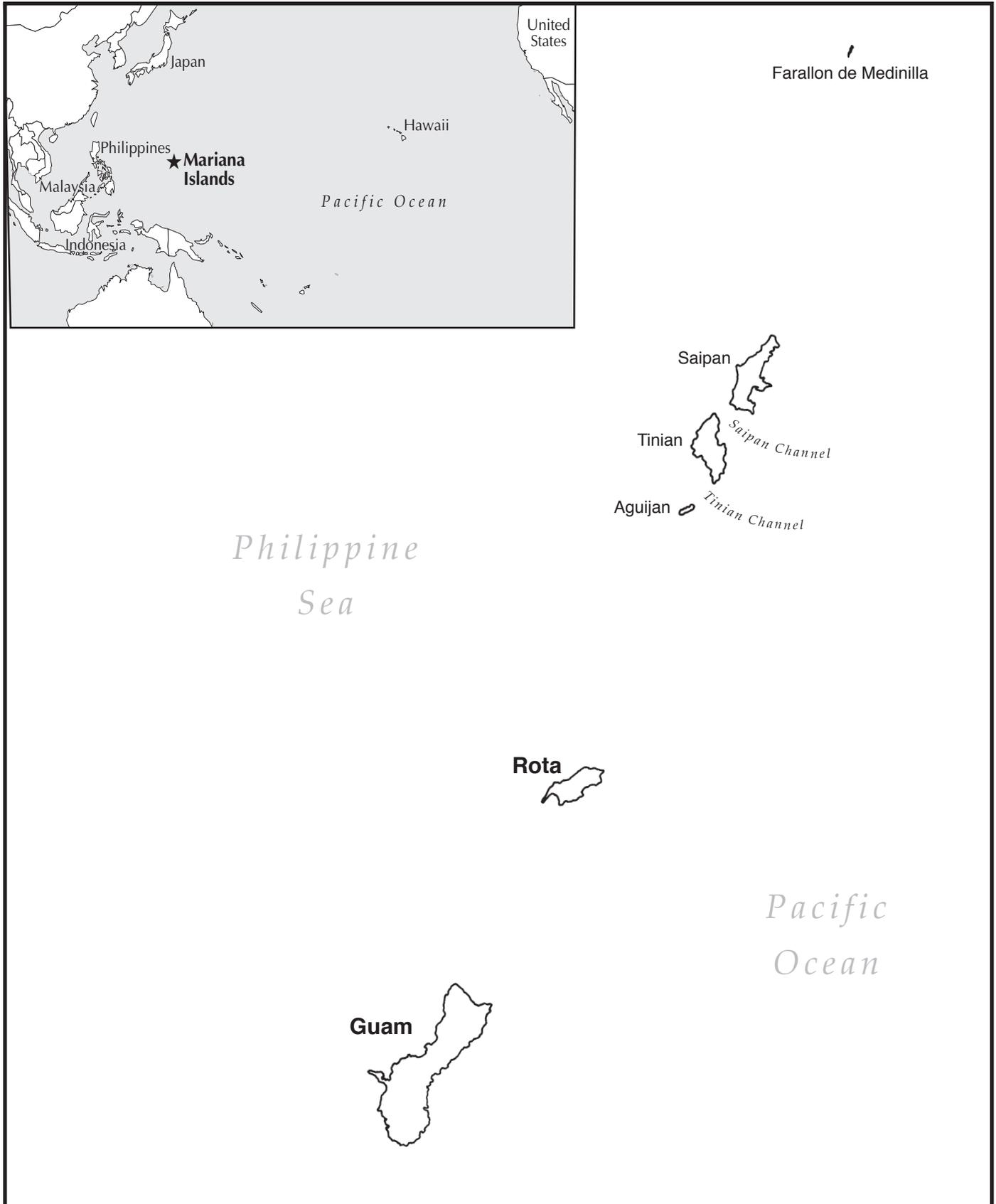
Listed Species and Proposed Critical Habitat

Under the Endangered Species Act of 1973, as amended (the Act), the United States (U.S.) Department of the Interior, Fish and Wildlife Service (Service) proposes to designate critical habitat for three endangered species in the U.S. Territory of Guam and the island of Rota, Commonwealth of the Northern Mariana Islands (CNMI) (Figure 1-1). This chapter provides information on the listed species and proposed critical habitat areas. Unless otherwise noted, information in Chapter 1 is summarized from the “Endangered and Threatened Wildlife and Plants; Determinations of Prudency for Two Mammal and Four Bird Species in Guam and the Commonwealth of the Northern Mariana Islands and Proposed Designations of Critical Habitat for One Mammal and Two Birds Species” (the proposed rule), drafted by the Service and published in the *Federal Register* (FR) on October 15, 2002 (50 Code of Federal Regulations [CFR] Part 17). Overlay resource maps were provided by the Service.

Prior to current proposed rule, a proposed rule designating critical habitat for six listed species on Guam was published on June 14, 1991 and subsequently was withdrawn on April 4, 1994. Rule withdrawal occurred because most of the lands proposed as critical habitat had by this time been incorporated in the Guam National Wildlife Refuge overlay lands, and the Service therefore determined that critical habitat designation was not prudent because it would not provide these species with any benefit beyond that already provided by the refuge overlay lands. Since the withdrawal of the proposed 1991 rule, several judicial decisions in court cases examining critical habitat determinations have rejected rationales used by the Service in “not prudent” findings. As a result, the Service has reviewed the prudency determination for the six listed Guam species in response to a court challenge of the 1994 withdrawal of the proposed rule, and determined that designation of critical habitat for three of the species is prudent (see Section 1.1). In addition, the Service has determined that designation of critical habitat for one of the species is prudent on Rota. Discussion of the factors leading to the prudency determination is provided in the proposed rule.

1.1 THE LISTED SPECIES

The Service proposes critical habitat on Guam for one mammal, the endangered Mariana fruit bat (*Pteropus mariannus mariannus*), and two endangered bird species, the Guam Micronesian kingfisher (*Halcyon cinnamomina cinnamomina*) and the Mariana crow (*Corvus kubaryi*). The Service also proposes critical habitat for the endangered Mariana crow on Rota. The proposed rule contains a detailed discussion of the species taxa, including taxonomy, ecology, habitat requirements, historical and current distribution, and threats to the continued existence of each of these species.



NORTH

0 5 10 20



SCALE IN MILES

**Figure 1-1
LOCATION MAP**

Draft Economic Analysis of Proposed Critical Habitat Designations for
Threatened and Endangered Species on Guam and Rota

1.2 PROPOSED CRITICAL HABITAT AREAS

The Service is proposing to designate critical habitat for the Mariana fruit bat, the Guam Micronesian kingfisher, and the Mariana crow on the island of Guam (Figure 1-2) and for the Mariana crow on the island of Rota (Figure 1-3). Two critical habitat areas are proposed on Guam, one in the north and one in the south. Because the *primary constituent elements* (see Section 1.2.1) for each of the three species are concentrated predominantly in the remaining tracts of native forest on the island, the size, shape, and locations of the proposed critical habitat areas largely represent these tracts of forest. Thus, the northern area is the same for the Mariana fruit bat and Guam Micronesian kingfisher, and the southern area is the same for all three species. In the case of the Mariana crow, the northern area is slightly smaller than that for the Mariana fruit bat or Guam Micronesian kingfisher because of differences in the conservation goals set for each species in their recovery plans. The smaller extent of the proposed critical habitat for the Mariana crow on Guam reflects the lower target population size for Guam indicated in the revised recovery plan and the addition of proposed critical habitat for the crow on Rota. The area proposed on Rota for the Mariana crow is composed of limestone, secondary, agricultural, coastal, and ravine forests consisting of native and non-native plants.

Information on the proposed critical habitat areas, including the *primary constituent elements* essential for the conservation of each species, their general location and terrain, excluded features and structures, acreages, land ownership, and existing land management is provided herein. Further details such as map coordinates of boundary points are provided in the proposed rule. Areas of each of the critical habitat units (A, B, and C) are contained in Table 1-1.

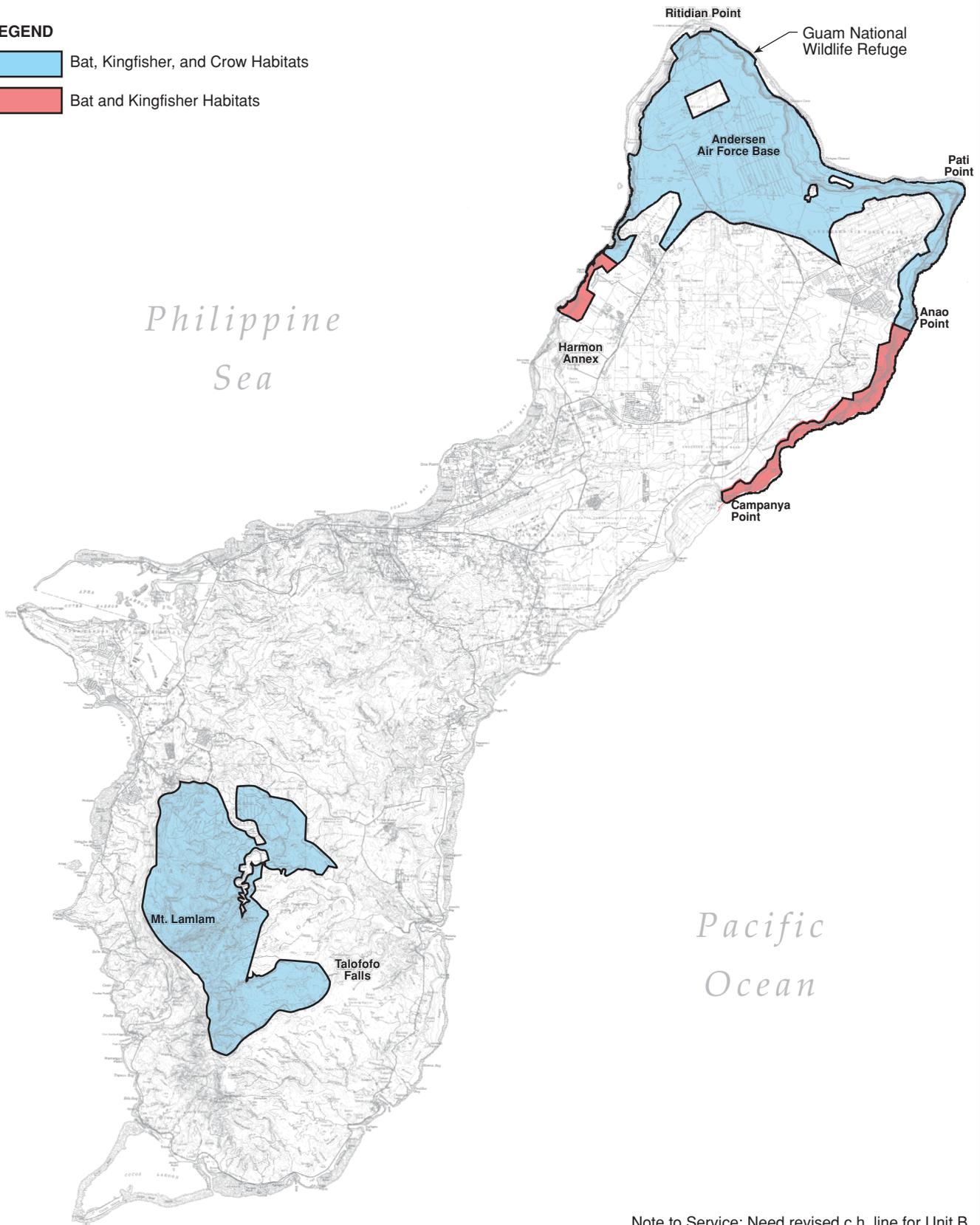
1.2.1 Primary Constituent Elements

Each of the proposed critical habitat areas provides one or more of the *primary constituent elements* essential for the conservation of the animal species. *Primary constituent elements* are physical and biological features that are essential to the conservation of the species and that may require special management considerations and protection. Such features include, but are not limited to, the following:

- space for individual and population growth and for normal behavior;
- food, water, air, light, minerals and other nutritional or physiological requirements;
- cover or shelter;
- sites for nesting and rearing of offspring; and
- habitats that are protected from disturbance and are representative of the historic geographical and ecological distributions of the species.

LEGEND

- Bat, Kingfisher, and Crow Habitats
- Bat and Kingfisher Habitats



Note to Service: Need revised c.h. line for Unit B



NORTH

0 9000 18,000



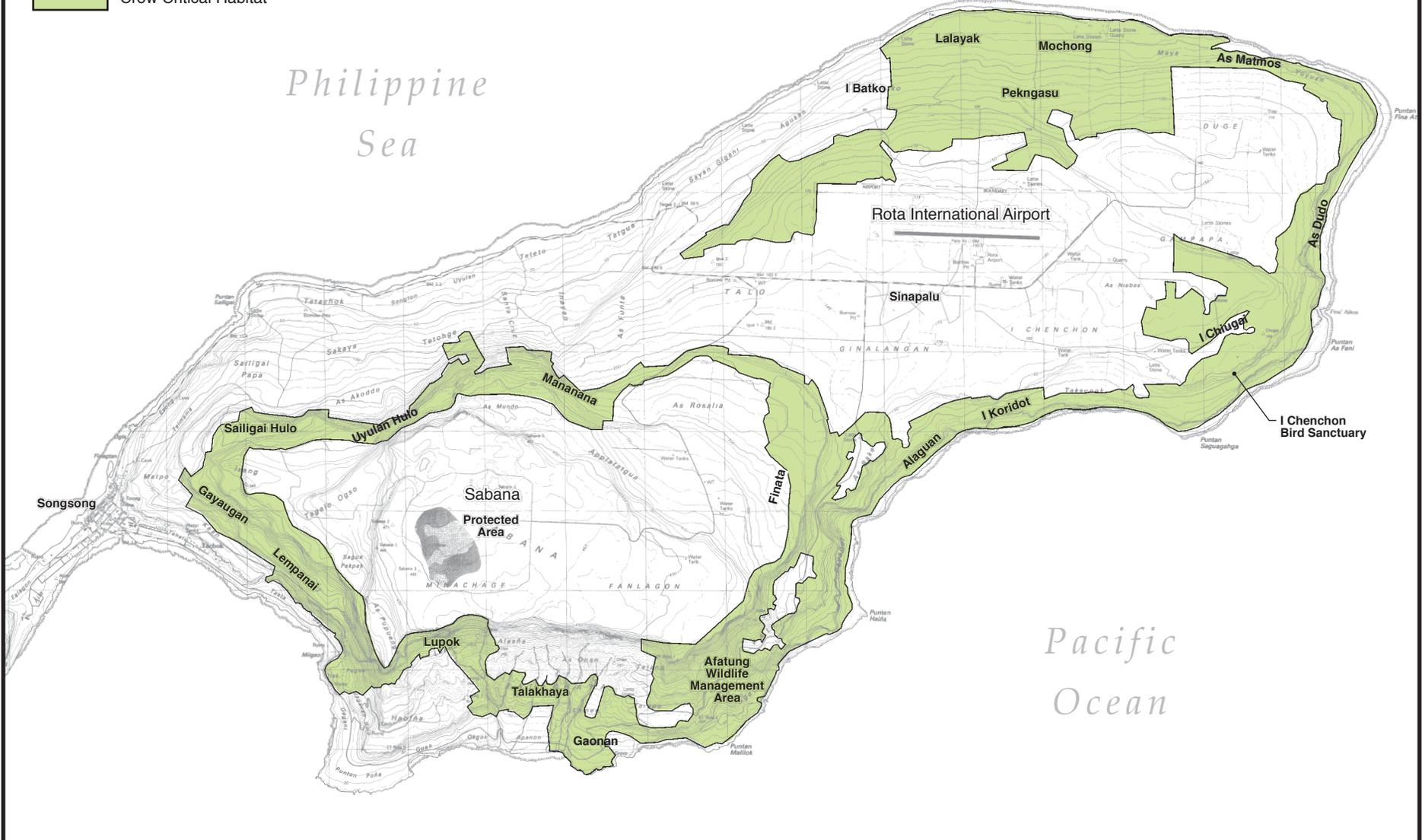
Scale in Feet

Figure 1-2
ISLAND OF GUAM

Draft Economic Analysis of Proposed Critical Habitat Designations for Threatened and Endangered Species on Guam and Rota

LEGEND

 Crow Critical Habitat



NORTH

0 3000 6000 12000



SCALE IN FEET

**Figure 1-3
ISLAND OF ROTA**

Draft Economic Analysis of Proposed Critical Habitat Designations for Threatened and Endangered Species on Guam and Rota

Table 1-1: Summary of Land Ownership and Acreage Within Proposed Critical Habitat on Guam¹ and Rota²

Land Ownership	Total Area (ac)	Percent of Island	Percent of Critical Habitat
Unit A - Northern Guam			
Federal	12,288	9.1%	49.5%
Territorial	1,555	1.2% ³	6.3%
Private	63	0.05%	0.3%
Not Determined	432	0.3%	1.7%
Subtotal	14,338	10.6%	57.8%
Unit B - Southern Guam			
Federal	7,186	5.3%	29.0%
Territorial	1,355	1.0%	5.5%
Private	1,826	1.4%	7.4%
Not Determined	97	0.1%	0.4%
Subtotal	10,464	7.8%	42.2%
Total Guam Critical Habitat			
Federal	19,474	14.4%	78.5%
Territorial	2,910	2.2%	11.7%
Private	1,889	1.4%	7.6% ⁴
Not Determined	529	0.4%	2.1%
Total	24,802	18.4%	100%
Unit C - Rota			
Federal	0	0%	0%
Territorial	5,581	26.8%	91.7%
Private	503	2.4%	8.3%
Not Determined	Not applicable (N/A)	N/A	N/A
Total	6,084	29.2%	100%

Table Notes:

Total Area of Guam = 134,920 ac (54,600 ha)
Total Area of Rota = 20,834 (8,431 ha)

Table References:

- ¹ Unless indicated in a footnote, Federal and private land ownership information on Guam was provided by Bureau of Planning and Department of Land Management, GovGuam.
- ² Rota land ownership information provided by Marianas Public Lands Authority.
- ³ Of the 5,581 ac of public land proposed for critical habitat, 4,776.3 ac are conservation land.
- ⁴ Parcel 59-4 and 59-5 information from *Parcelling of Lot 59-3 Municipality of Talafofo*, Tolbert MacFarlane and Associates. Provided by Oliver Weston Bordallo, Attorney at Law, August 7, 2002.

The *primary constituent elements* for the Mariana fruit bat, Guam Micronesian kingfisher, and Mariana crow are those habitat components that are essential for the primary biological needs of foraging, nesting, rearing of young, intra-specific communication, roosting, dispersal, genetic exchange, or sheltering. The proposed rule provides detailed information on the specific foraging, roosting, and reproductive needs of all three species on Guam and Rota. Summaries for each of the three species follows.

Mariana fruit bat. The *primary constituent elements* required by the Mariana fruit bat for foraging are found in undeveloped areas supporting limestone, ravine, swamp, coastal, secondary, and agricultural forests composed of both native and introduced plant species. *Primary constituent elements* for roosting and reproduction are found in undeveloped and most remote forest areas protected from human disturbance.

Mariana crow. The *primary constituent elements* required by the Mariana crow for foraging are found in areas that support limestone, secondary, ravine, swamp, agricultural, and coastal forests composed of native and introduced plant species. These forest types provide the *primary constituent elements* of habitat for the wide range of plant and animal food resources and standing dead trees and plants required by the crow. *Primary constituent elements* for roosting and reproduction are found in relatively large and undisturbed tracts of forest containing emergent and subcanopy trees with dense cover for breeding, sufficient area of predominantly native limestone forest to allow nesting away from roads and forest edges and to support breeding territories, and foraging areas for non-breeding juvenile crows.

Guam Micronesian kingfisher. The *primary constituent elements* required by the Guam Micronesian kingfisher for foraging include forest with structure sufficiently diverse to provide exposed perches and ground surfaces, leaf litter, and other substrates that support a wide range of vertebrate and invertebrate species for prey. The *primary constituent elements* for roosting and reproduction are found in large tracts of limestone, secondary, ravine, and coastal forests. These forests include the constituent elements of suitable nesting areas in native forests with a closed canopy and well-developed understory vegetation, large standing dead trees at varying stages of decay and mud nests of *Nasutitermes* spp. termites for nest cavity excavation, as well as sufficient area overall to support large kingfisher territories.

1.2.2 Excluded Areas, Features, and Structures

As indicated in the proposed rule, existing manmade features and structures do not contain, and are not likely to develop, the *primary constituent elements* required by these species. Small existing manmade structures may not be easily excluded by mapping unit boundaries. These structures are considered “unmapped holes,” which are found within the boundaries of critical habitat areas, and are not considered by the Service to be part of the critical habitat. Examples include runways, taxiways, parking aprons, and maintenance paths at Northwest Field, Andersen Air Force Base (AAFB), and the Guam Tracking Station separated by Detachment 5, 22nd Space Operations Squadron, also at Northwest Field. The operation and maintenance of these manmade features and structures are not expected to be impacted by critical habitat designation.

Other man-made features and structures that do not contain *primary constituent elements* include:

- water system components such as wells, pumping stations, pipelines, storage tanks, gaging stations, intakes, irrigation ditches, and appurtenances;
- telecommunication towers and radar installations, as well as associated structures and equipment;
- buildings;
- electrical power transmission lines, associated rights-of-way, substations, and related facilities; and
- paved roads and trails.

Because these areas are excluded from the proposed designation, they are also excluded from this economic analysis. Henceforth, references to the proposed critical habitat exclude features and structures discussed above unless indicated otherwise.

1.2.3 Acreage

The total acreage of the island of Guam is 134,920 acres (ac) or 54,600 hectares (ha). As shown in Table 1-1, the acreage of proposed critical habitat on Guam totals approximately 24,802 ac (10,037 ha) for the Mariana fruit bat and Guam Micronesian kingfisher, of which 14,338 ac (5,802 ha) are in the north (10.6 percent of the island) and 10,464 ac (4,234 ha) are in the south (7.8 percent of the island). The acreage of proposed critical habitat for the Mariana crow on Guam is a subset of the fruit bat and kingfisher areas and totals approximately 23,004 ac (9,309 ha), of which 12,540 ac (5,075 ha) are in the north (9.3 percent of the island) and 10,464 ac (4,234 ha) are in the south (7.8 percent of the island).

The total acreage of the island of Rota is approximately 20,834 ac (8,431 ha). As shown in Table 1-1, proposed critical habitat for the Mariana crow on Rota totals 6,084 ac (2,462 ha) or 29.2 percent of the island.

1.2.4 Location and Terrain

Figures 1-2 and 1-3 show the general locations of the proposed critical habitat units on Guam and Rota. Detailed boundary data are provided in the proposed rule.

The majority of proposed critical habitat is in uninhabited, remote areas. Two geographically separated areas in the north and south of Guam are being proposed for each species in order to decrease the risk of species extinction as a result of localized, random events such as typhoons and disease outbreaks. The specific areas proposed for critical habitat in northern and southern Guam were selected based on their current status as blocks of largely forested land containing the *primary constituent elements* required by each species. These areas include the last relatively large expanses of native forest on the island.

- **Unit A.** This northern Guam area is proposed for the Mariana fruit bat, Mariana crow, and Guam Micronesian kingfisher and defined by three sections. The first section consists of a thin

projection of forested land between the coastline and approximately 0.6 mile (mi) (1 kilometer [km]) inland that extends from the boundary between the Communications Annex and former Air Force Harmon Annex and the boundary of AAFB. The second section consists of most of the forested land between the southern boundary of AAFB and the coastline from Ritidian Point to Pati Point. The third section consists of the thin projection of forested land between the coastline and approximately 0.6 mi (1 km) inland that extends from Campanaya Point to the border of AAFB at Anao Point.

- **Unit B.** This southern Guam area is proposed for the Mariana fruit bat, Mariana crow, and Guam Micronesian kingfisher, and is defined by three sections. The first section includes most of the forested areas within Ordnance Annex and forested area above the 800-foot (ft) (244-meter [m]) elevation contour in the Sinaje region near Mount Lamlam. The second section consists of the forested areas at the headwaters of the Bubulao and Ugum Rivers and the forested areas along and between both rivers until their confluence approximately 0.6 mi (1 km) above Talofof Falls. The third section consists of the forested areas outside Ordnance Annex that occur along and between the Maagas and Mahlac Rivers to where they converge and become the Talofof River.

The area proposed for critical habitat on Rota includes tracts of undisturbed mature limestone forest with sufficient habitat area to absorb the variable impacts of natural disturbances, such as typhoons, and still maintain the integrity of the *primary constituent elements* to support crow populations.

- **Unit C.** This area consists of forested and encompassing much of the undeveloped areas on Rota. Unit C is proposed for the Mariana crow and consists of five sections. The first section includes the Afatung Wildlife Management Area in the Pali region and the forested areas in the Finata, Alaguan, and I Koridot regions. The second section consists of the I Chenchon Bird Sanctuary and the forested areas in the I Chiugai and As Dudo regions of eastern Rota. The third section consists of much of the forested areas in the As Matmos, Mochong, Lalayak, Pekngasu, and I Batko regions, as well as the forested areas adjacent to the Rota Resort. The fourth section includes much of the forested areas in the Mananana, Uyulan Hulo, Sailgai Hulo, Gayauga, Lempanai, and Lupok regions. Last, the fifth section includes much of the forested areas, as well as some of the grassland areas, in the Talakhaya and Gaonan regions of southern Rota.

1.2.5 Occupied and Unoccupied Areas

Mariana fruit bat. The Service considers about 24,802 ac (10,037 ha) or 100 percent of the proposed critical habitat for the Mariana fruit bat to be *occupied* by the species. No *unoccupied* areas are included in the proposed critical habitat for the Mariana fruit bat.

Mariana crow. For the Mariana crow, about 1,920 ac (777 ha) or approximately 8 percent of the proposed crow critical habitat on Guam (23,004 ac or 9,309 ha) are considered to be *occupied*, and about 21,084 ac (8,532 ha) or approximately 92 percent are considered *unoccupied*. The *unoccupied* areas were included in the proposed designation because the Service believes they are necessary to provide for the long-term survival and conservation of the species. On Rota, 6,084 ac (2,462 ha) or 100 percent of the proposed critical habitat for the Mariana crow are considered *occupied*; no areas are considered *unoccupied*.

Guam Micronesian kingfisher. The Guam subspecies of Micronesian kingfisher is currently extirpated in the wild, so no habitat is considered currently *occupied*. Therefore, about 24,802 ac (10,037 ha) or 100 percent are considered *unoccupied*. A captive population of 63 birds has been established and is maintained at 11 zoos in North America, and the Guam Division of Aquatic and Wildlife Resources (DAWR) is initiating a captive translocation program on Guam. Once the brown treesnake is controlled or eradicated, Guam Micronesian kingfishers can be reintroduced to Guam. The *unoccupied* habitat is essential to the successful reintroduction of kingfishers.

1.2.6 Land Ownership

Table 1-1 provides detailed information on ownership and uses of lands proposed as critical habitat. Landowners include the Federal government (Department of Defense and Service), Territorial government (GovGuam), CNMI government, or private entities.

On Guam, approximately 19,474 ac (7,881 ha) or 78.5 percent of the proposed critical habitat is owned by the Federal government. Approximately 2,909 ac (1,177 ha) or 11.7 percent are owned by GovGuam, 1,888 ac (764 ha) or 7.6 percent are privately owned, and 531 ac (215 ha) or 2.1 percent are of unknown ownership.

On Rota, approximately 5,581 ac (2,259 ha) or 91.7 percent of the area proposed as critical habitat are public lands owned by CNMI. Of these, 4,776 ac (1,933 ha) or 78.5 percent of the area proposed as critical habitat are conservation lands. Approximately 503 ac (204 ha) or 8.3 percent are privately owned.

1.2.7 Existing Land Management

Areas proposed for critical habitat are subject to existing land management regulations and programs. Such regulations and management programs are described in chapter 4. Specific natural resource management areas are identified herein.

On Guam, there are approximately 22,500 ac (9,105 ha) of refuge overlay units of the Guam National Wildlife Refuge, managed under cooperative agreements between the Service and the U.S. Navy (Navy), and the Service and the U.S. Air Force (Air Force). Approximately 4,200 ac (1,700 ha) of GovGuam lands are reserved as conservation areas under the jurisdiction of the Chamorro Land Trust Commission.

On Rota, proposed critical habitat includes a small portion of the Sabana Protected Area and most of the Afatung Wildlife Management Area and I Chenchon Bird Sanctuary.

CHAPTER 2

Physical and Socioeconomic Profile of Guam and Rota

To provide context for evaluating the economic impacts of the proposed critical habitat designation, this chapter presents (1) physical descriptions of the islands of Guam and Rota, and (2) socioeconomic profiles of Guam, a Territory of the U.S., and Rota, an island within the CNMI. A summary of socioeconomic data is presented in Table 2-1.

2.1 PHYSICAL DESCRIPTIONS

Guam and Rota are the two southernmost islands in the Mariana Islands archipelago (Figure 1-1). The Mariana Islands are volcanic in origin resulting from subduction of the Pacific tectonic plate beneath the Philippine plate at the Mariana trench, which runs south and east of Guam.

The islands are located in the low-latitudes zone (14 degrees [°] north). Average daily temperatures do not vary much throughout the year. Both islands have a maritime tropical climate with temperatures ranging from 70 to 90 ° Fahrenheit (F) (21 to 32 ° Celsius [C]), and generally in the mid-80s ° F (high-20s ° C) during the day, decreasing to the mid-70s ° F (low-20s ° C) during the night. Relative humidity ranges from 75 to 100 percent, with daytime humidity in the mid-70 percent, typically increasing at night.²

While temperature and humidity are relatively constant, rainfall and wind conditions vary during the year, defining the seasons on Guam and Rota. There are two primary and two secondary seasons. The primary dry season, from January through April, is characterized by very little rainfall and consistent trade winds, predominantly from the northeast at 15 to 25 miles per hour (mph) (24 to 40 kilometers per hour [kph]); the primary rainy season, from mid-July to mid-November, features heavy rains and high winds associated with occasional typhoons and tropical storms.³ The secondary seasons are transitional periods and extend from May to mid-July and from mid-November through December, and can be either rainy or dry. Guam's mean annual rainfall varies from 78.7 to 98.4 inches (in) (200 to 250 centimeters [cm]), with slightly less annual rainfall on Rota.⁴

² U.S. Navy. November 2001. *COMNAV Marianas, Final Integrated Natural Resources Management Plan for Navy Lands, Guam, Plan Duration 18 November 2001 to 17 November 2006.*; and Juan C. Tenorio & Associates, Inc. January 1996. *Commonwealth of Rota, Rota Physical and Economic Master Plan.*

³ Recent typhoons to impact Guam include Typhoon Chata'an with sustained winds of 75 mph (121kph) and gusts to 90 mph (145 kph), which hit Guam on July 5, 2002, and Typhoon Halong with sustained winds of 109 mph (175 kph) and gusts to 132 mph (212 kph), whose eye passed approximately 75 mi (120.4 km) to the south of Guam on July 11, 2002.

⁴ Eldredge, L.G. 1983. *Summary of Environmental and Fishing Information on Guam and the Commonwealth of the Northern Mariana Islands.* NOAA Technical Memorandum, National Marine Fisheries Service. Cited as reported in: U.S. Fish and Wildlife Service. 1990. *Native Forest Birds of Guam and Rota of the Commonwealth of the Northern Mariana Islands Recovery Plan.*

Table 2-1: Summary of Socioeconomic Factors - Guam

Item	1990	1999	2000	Change Since 1990
Resident Population ^{1,2}	133,152		154,805	16.3%
Annual Visitors ³	769,900	1,161,800	1,288,002	67.3%
Income from Major Industries ³				
Gross Business Receipts (\$M)	\$3,089.5	\$3,605.7	\$3,677.8	19.0%
Federal Government Expenditures (\$M)	\$1,101.9*	\$889.6	\$888.3	-19.4%
Labor ^{1,2}				
Total Labor Force	90,990		105,014	15.4%
Civilian Labor Force	54,186		64,452	18.9%
Military Labor Force	11,952		4,442	-62.8%
Employed (Civilian)	52,144		57,053	9.4
Percent Unemployed	3.8%		7.0 %	
Jobs - Top Industry Sectors ^{1,2}				
Tourism Services	4,953		10,278	107.5%
Education, Health & Social Services	8,677		8,412	-3.1%
Retail Sales	9,959		7,558	-24.1%
Public Administration	5,698		6,527	14.5%
Construction	8,023		5,532	-31.0%
Personal Income ^{1,2}				
Mean for Households	\$38,873**	\$49,617		27.6%
Mean for Families	\$39,378**	\$51,674		31.2%
Families Below Poverty Level	3,429 (12.6%)**	6,466 (20%)		88.6%
Per Capita	\$9,928**	\$12,722		28.1%
Total Personal Income (\$M)	\$1,321.9	\$1,969.4		48.9%
Gross Island Product (GIP) (\$M)	\$2,312.5	\$2,718.5	\$2,772.8	19.9%

Notes:

- * Value is from 1993
- ** Values are from 1989
- \$M Millions of dollars

Table References:

- ¹ U.S. Department of Commerce. 1990b. *1990 Census of Population and Housing, Social, Economic and Housing Characteristics, Guam*. 1990 CPH-6-G.
- ² U.S. Department of Commerce. 2002b. *Population and Housing Profile, 2000 Census of Population and Housing, Guam*, <http://www.census.gov/prod/cen2000/island/Guamprofile.pdf>; accessed September 10, 2002.
- ³ Bank of Hawaii Web site. *Guam Economic Report, August 2001*, <http://www.boh.com/econ/pdfs/Guam.pdf>; accessed September 4, 2002.

2.1.1 Guam

Guam, the largest island in the Mariana Islands archipelago, is located in the western Pacific Ocean at approximately 13° 30' north latitude and 145° 0' east longitude. It is approximately 3,700 mi (5,955 km) west-southwest of Hawai'i, 1,560 mi (2,511 km) southeast from Japan, and 1,500 mi (2,414 km) east of Manila (Figure 1-1). The island is approximately 30 mi (49 km) long, varies between 4 and 8 mi (6.4 and 12.9 km) wide, and has a total land area of about 214 square mi (554.3 square km).⁵

Guam was formed by two separate emergent volcanic mountains that fused and formed one island, with the upper few hundred feet comprised of basalt and andesite, tuff-derived sedimentary rock, and limestone.⁶ The island is separated into three main structural provinces: the limestone plateau of northern Guam; the folded volcanic rocks of central Guam; and the east-dipping volcanic rock of southern Guam.⁷ There are two major fault zones, the Adelup and the Talofofu faults. Topography, surface drainage, distribution of bedrock and soils, ground water storage and discharge, landslide potential, and coastal formation of the island are strongly affected by the numerous smaller faults, vertical joints, and local fractures. The coastline is comprised of a relatively narrow margin of beach interspersed with basalt or limestone rock formations. Beach deposits consist of beach sand and gravel, beach rock in the intertidal zone, and patches of recently emerged detrital limestone.⁸ A fringing reef extends around the coastline to approximately 200 ft (61 m) offshore. The reef complex is transected at various points by cracks or fissures that create shallow to slightly deeper pools in the back reef. The ocean bottom drops off abruptly just past the reef.

Types of vegetation communities on Guam include forest (*e.g.*, limestone), herbaceous strand, mangrove scrub, and managed land. The limestone forest is native forest that covers areas of exposed limestone. It still exists where agriculture is not conducted and in inaccessible areas such as steep cliffs. Both relatively undisturbed forest, containing original trees, and secondary forest, which have undergone natural and/or anthropogenic disturbance, occur on Guam. Most species in limestone forests are native with a few endemics, and include the banyan (*Ficus prolixa*), *Pisonia grandis*, *Premna serratifolia*, *Pandanus tectorius*, *Aglaia mariannensis*, and *Guamia mariannae*. Disturbed areas of limestone forest may include *Triphasia trifolia* and tangantangan (*Leucaena leucocephala*).⁹

⁵ Karolle, Bruce G. 1993. *Atlas of Micronesia, Second Edition*. Published by The Bess Press, Inc., Honolulu, Hawaii.

⁶ Tracy, J.I. *et al.* 1964. *General Geology of Guam*. U.S. Government Printing Office. Washington, D.C. Cited in U.S. Navy. November 2001. *COMNAVMARIANAS, Final Integrated Natural Resources Management Plan for Navy Lands, Guam. Plan Duration 18 November 2001 to 17 November 2006.*

⁷ *Ibid.*

⁸ U. S. Geological Survey (USGS) 1992. *Geologic Map and Sections of Guam, Mariana Islands*. 1:50,000. Plate I, Professional Paper 403A. Cited in U.S. Navy. November 2001. *COMNAVMARIANAS, Final Integrated Natural Resources Management Plan for Navy Lands, Guam. Plan Duration 18 November 2001 to 17 November 2006.*

⁹ Whistler, Dr. W.A. July 1992. *Botanical Survey of the U.S. Navy Relocation Sites, Territory of Guam*. Quoted in Appendix D, FEIS for Proposed Facilities Development and Relocation of Navy Activities to the Territory of Guam from the Republic of the Philippines. July 1993.

2.1.2 Rota

Rota is the southernmost and third largest island in the CNMI, after Saipan and Tinian (Figure 1-1). Located at approximately 14° 10' north latitude and 145° 10' east longitude, it is approximately 11 mi (17.7 km) long and 4 to 7 mi (6.4 to 11.3 km) wide, with an area of 32.9 square mi (85.2 square km).¹⁰ Rota is approximately 30 mi (49 km) north of Guam.

There is no published information on Rota's bedrock, but it is likely to be similar to Saipan and Tinian because of their common origins. These islands are underlain with volcanic rock resulting from volcanic eruptions approximately 60 million years ago. The volcanic cores, which were formed below sea level, have slowly uplifted and emerged through the ocean surface, and a series of limestone plateaus formed as coral reefs. Ninety-eight percent of Rota's area is covered with limestone plateaus of coral reef origin.

Rota's topography has five geomorphic subdivisions: the coastal lowlands, a northern plateau, a southern plateau (the Sabana), a volcanic area, and the western peninsula. On the island's north shore, coastal lowlands dominate and are bounded on the seaward side by a narrow reef margin. Sandy soils with coconut palms occur in the inland areas, and strand vegetation dominates the coastal margin. The northern plateau, at an elevation of approximately 450 ft (137 m), comprises the eastern part of the island, with its south and east sides terminating in cliffs with rocky shoreline below. On the north side, the plateau slopes gradually toward the sea; this is the location of Mochong Beach, the largest beach on Rota. The Sabana plateau has an elevation exceeding 1,400 ft (426.7 m). Its western side is marked by cliffs that form low plateaus. On the northeast side, less pronounced cliffs and slopes lead gradually to the northern plateau. The southern and a portion of the northern boundaries of the Sabana terminate in dramatically shaped precipitous cliffs. In the northern part of the Sabana, Mt. Manila is the highest point¹¹ at 1,627 ft (495.9 m). The volcanic area of the island is very different in appearance from the other geomorphic subdivisions. Streams have eroded the area into deeply etched ridges and valleys predominately covered by sword grass. The western peninsula is a narrow isthmus that connects Mt. Taipingot with the remainder of the island. Mt. Taipingot rises in terrace formations to approximately 460 ft (140.2 m), and the peninsula is bounded by precipitous cliffs.

Vegetation on Rota consists of mixed second-growth forests, grassy savannas, and dense thickets of introduced tangantangan (*Leucaena leucocephala*). Approximately 60 percent of Rota's land area still remains in native forest, although much is altered and not pristine.¹² The best developed and most pristine native forest (including limestone forest) is on the slopes and cliffs of the high plateau (Sabana).

¹⁰ Juan C. Tenorio & Associates, Inc. January 1996. *Commonwealth of Rota, Rota Physical and Economic Master Plan*.

¹¹ Personal communication between Mr. Joe Rosario, Division Head, Division of Land Registration and Survey, CNMI Department of Lands and Natural Resources, and Ms. Jane Dewell, Belt Collins. September 12, 2002.

¹² Engbring J., F.L. Ramsey and V.J. Wildman. 1986. *Micronesian Forest Bird Survey, 1982: Saipan, Tinian, Aguiguan, and Rota*. U.S. Fish and Wildlife Service. As reported in Rota Southern Cross Resort Project Partnership. January 1991. *Environmental Impact Assessment Report, Rota Plumeria Country Club, Applatatgua, Rota*.

2.2 SOCIOECONOMIC PROFILE

Socioeconomic data on the Territory of Guam and Rota, CNMI, is summarized below and in Tables 2-1 (Guam) and 2-2 (Rota, CNMI). Information sources for Guam included census data for 1990 and 2000,¹³ and a report by the Bank of Hawaii.¹⁴ Information for Rota was also drawn from 1990 and 2000 census data,¹⁵ and from a Bank of Hawaii report,¹⁶ although the latter source primarily provided information on CNMI that reflects the larger population center on Saipan.

2.2.1 Guam

2.2.1.1 Population and Distribution

Guam had a population of 133,152 residents in 1990, which increased to 154,805 by 2000. The growth rate between 1990 and 1999 was 2.3 percent, which is low for developing economies in the Pacific Islands where a growth rate between 2.5 and 4.0 percent is typical.¹⁷ Approximately 40 percent of the population resides in villages of the central region, Guam's economic and urban center.

U.S. military personnel, both Navy and Air Force, reside on Guam. In 2000, the Navy had approximately 4,000 in uniform and a similar number of dependants. The Air Force had approximately 1,800 in uniform and 2,200 dependants. The U.S. military accounts for approximately 7.8 percent of the resident population on Guam.

In 2000, the median age of Guam's population was 27.4 years. The ethnic makeup was dominated by persons of Chamorro (37.0 percent) and Asian descent (32.5 percent, the majority of which are Filipino [26.3 percent]), followed by White (6.8 percent).

There were 47,677 housing units on Guam in 2000, with occupancy at 81.3 percent. Owner occupied homes accounted for 48.4 percent, while renter occupied homes accounted for 51.6 percent. The average household size was 3.89 people, and the average family size was 4.27.

¹³ U.S. Department of Commerce. 1990b. *1990 Census of Population and Housing, Social, Economic and Housing Characteristics, Guam*. 1990 CPH-6-G.

U.S. Department of Commerce Web site. 2002b. *Population and Housing Profile, 2000 Census of Population and Housing, Guam*. <http://www.census.gov/prod/cen2000/island/GUAMprofile.pdf>; accessed September 10, 2002.

¹⁴ Bank of Hawaii. *GUAM Economic Report, August 2001*. Bank of Hawaii Web site, <http://www.boh.com/econ/pdfs/GuamRpt.pdf>; accessed September 4, 2002.

¹⁵ U.S. Department of Commerce. 1990a. *1990 Census of Population and Housing, Social, Economic and Housing Characteristics, Commonwealth of the Northern Mariana Islands*. 1990 CPH-6-CNMI.

U.S. Department of Commerce Web site. 2002a. *Population and Housing Profile, 2000 Census of Population and Housing, CNMI (Rota)*, <http://www.census.gov/prod/cen2000/island/CNMIprofile.pdf>; accessed September 10, 2002.

¹⁶ Bank of Hawaii Web site. *Commonwealth of the Northern Mariana Islands, Economic Report, August 2001*, <http://www.boh.com/econ/pdfs/CNMI.pdf>; accessed September 4, 2002.

¹⁷ Bank of Bank of Hawaii Web site. *GUAM Economic Report, August 2001*, <http://www.boh.com/econ/pdfs/GuamRpt.pdf>; accessed September 4, 2002.

Table 2-2: Summary of Socioeconomic Factors - Rota, CNMI

Item	1990	1999	2000	Change Since 1990
Resident Population ^{1,2}	2,295		3,283	43.1%
Annual Visitors (CNMI) ³	435,455	501,788	528,597	21.4%
Income from Major Industries ³				
Visitor Expenditures (\$M)	\$419.7	\$406.5	\$430.0	2.5%
Labor ^{1,2}				
Total Labor Force	1,545		2,209	43.0%
Employed	1,108		1,591	43.6%
Unemployment Rate	2.3%		6.6 %	
Jobs - Top Industry Sectors ^{1,2}				
Public Administration	178		334	85.4%
Tourism Services	169		324	91.7%
Construction	282		205	-27.3%
Education, Health & Social Services	158		197	24.7%
Agriculture	77		114	48.1%
Retail Sales	105		109	3.8%
Personal Income ^{1,2}				
Mean for Households	\$28,718*	\$42,524		48.1%
Mean for Families	\$29,644*	\$40,244		35.8%
Families Below Poverty Level	111 (37.1%)*	124 (23%)		11.7%
Per Capita	\$9,961*	\$10,326		3.7%
Total Personal Income (\$M)	\$22.9	\$33.9		47.8%
GIP (CNMI) (\$M) ³		\$696.3		

Notes:

- * Values for 1989
- \$M Millions of dollars

Table References:

1. U.S. Department of Commerce. 1990a. *1990 Census of Population and Housing, Social, Economic and Housing Characteristics, commonwealth of the Northern Mariana Islands*. 1990 CPH-6-CNMI
2. U.S. Department of Commerce. 2002a. *Population and Housing Profile, 2000 Census of Population and Housing, CNMI (Rota)*, <http://www.census.gov/prod/cen2000/island/CNMIprofile.pdf>; accessed September 10, 2002.
3. Bank of Hawaii Web site. Commonwealth of the Northern Mariana Islands, Economic Report, August 2001, <http://www.boh.com/econ/pdfs/CNMI.pdf>; accessed September 4, 2002.

2.2.1.2 Labor Force and Employment

In 2000, Guam's potential labor force, which is the population of individuals 16 years and older, numbered 105,014, with 65.6 percent (or 68,894) in the labor force. Of those in the labor force, 93.6 percent (64,452) were civilian and 6.4 percent (4,442) were with the armed forces. The unemployment rate was 7.0 percent.¹⁸

2.2.1.3 Personal Income

As reported in the 2000 census, the mean household income on Guam in 1999 was \$49,617 with the median income at \$39,317. The mean and median family incomes were slightly greater at \$51,674 and \$41,229, respectively. Guam's per capita income in 1999 was \$12,722, and total personal income was approximately \$2 billion.¹⁹

There were 6,466 families with incomes below the poverty level in 1999 (the poverty threshold for a four-person family was \$17,029);²⁰ this was approximately 20 percent of families.

2.2.1.4 Primary Economic Activity

Guam's economy is dominated by tourism and the U.S. military. The island is a popular vacation destination for Asian tourists, due to its tropical climate and relatively close proximity (3 to 4 hours flying time from Japan). In 2000, 1.3 million tourists came to Guam, which represents a tourist population of eight times Guam's resident population. More than 81 percent of these visitors were from Japan. The peak tourist years were between 1995 and 1997, when approximately 1.4 million tourists arrived annually. Hotel occupancy rates for Guam have gone from a high of 87.0 percent in 1996, to a low of 61.0 percent in 1999, and were at 63.0 percent in 2000. The decrease in tourism after 1997 was due to the Asian financial crisis and to the crash of a Korean Air Lines (KAL) jet in 1997, which prompted KAL to discontinue flights to Guam. Information on expenditures associated directly with tourism is not available. Information on gross business receipts shows that economic activity experienced a peak during 1995 to 1998, when gross receipts were \$4.2 to \$4.6 billion. These values dropped in 2000 when gross receipts were approximately \$3.7 billion. Retail and service sectors accounted for approximately 54 percent (in 1990) to 63 percent (in 1999 and 2000) of gross business receipts.

The U.S. military has had a presence on Guam since 1898. Total Federal spending on Guam ranged from approximately \$1.1 billion in 1993, 1994 and 1998, to a current level of approximately \$888.3 million. Of this, defense-related spending represented approximately 67.3 percent in 1994, which was down to 50.8 percent in 2000.

Of the 57,053 people employed on Guam in 2000, employment by the top industry sectors was as follows: 18.0 percent worked in tourism-related services; 14.7 percent worked in education, health

¹⁸ Percent unemployed is calculated as a proportion of the total potential labor force, which in 2000 was 105,014.

¹⁹ Population (154,805) x per capita income (\$12,722) = approximate total personal income (\$1,969.4 million).

²⁰ U.S. Census Bureau Web site. <http://www.census.gov/hhes/poverty/threshld/thresh99.htm>; accessed September 23, 2002.

and social services; 13.2 percent worked in retail; 11.4 percent worked in public administration; and 9.7 percent worked in construction. Private sector work accounted for 69.0 percent of employment, with 26.5 percent in government work. The remainder were self-employed or unpaid family workers.

The Gross Island Product (GIP) is a measurement of overall economic activity. The ability to calculate the GIP for Guam was limited recently since the Guam Legislature disbanded the Guam Finance Commission and transferred its responsibilities, which included creating and updating the GIP, to the Guam Department of Finance. Currently there are no funds allocated for this work. The GIP, which was approximately \$2.8 billion in 2000, is being provided here as a point of reference.

2.2.1.5 Outlook for Growth and Socioeconomic Change

Guam has been facing economic uncertainty since the rapid growth in the 1980s turned to rapid decline in the 1990s. The major growth sector for Guam continues to be tourism, which was on the rise since a low point between 1998 and 1999. However, since the events of September 11, 2001, there has been a marked decline in visitors to Guam: between August 2001 and August 2002, visitors decreased by 16 percent.²¹ Most tourists come from Japan, but the number of tourists from other Asian countries, including Korea and Taiwan, has been increasing. Since KAL discontinued flights to Guam in 1997, other carriers have been bringing tourists from Korea to Guam. Further development of this industry is uncertain at present because the majority of investment is from Asia, leaving Guam vulnerable to market trends in Asia.

Military expenditures on Guam have been on the decrease, and that trend is expected to continue. Other areas of income and growth need to be evaluated, but there has been no consensus among government officials in Guam on future areas for economic development.

2.2.2 Rota

2.2.2.1 Population and Distribution

The population on Rota in 1990 was 2,295, increasing to 3,283 in 2000. Approximately 4.7 percent of the CNMI population resides in Rota, according to the 2000 Census. The growth rate on Rota, calculated between 1980 (resident population was 1,261) and 1999 was 6.8 percent.²² A population growth rate of 2.5 to 4.0 percent is typical of developing economies in the Pacific Islands. Most of Rota's population is in the two towns of Songsong, at the southwest end of the island, and Sinapalu, south of the airport (Figure 1-3).

In 2000, the median age of Rota residents was 29.1 years. The ethnic makeup was dominated by persons of Chamorro (54.2 percent) and Asian descent (31.9 percent, the majority of which are Filipino [27.1 percent]).

²¹ Guam Visitors Bureau. August 2002. *Visitor Statistics*.

²² Bank of Hawaii Web site. *Commonwealth of the Northern Mariana Islands, Economic Report, August 2001*. <http://www.boh.com/econ/pdfs/CNMI.pdf>; accessed September 4, 2002.

There were 981 housing units on Rota in 2000, with 77.2 percent occupied. Owner occupied homes accounted for 51.8 percent, and renter occupied homes accounted for 48.2 percent. The average household size was 3.97 persons, and the average family size was 4.39.

2.2.2.2 Labor Force and Employment

In 2000, the potential labor force on Rota, which is the population of individuals 16 years and older, numbered 2,209, with 78.6 percent (or 1,736) in the labor force. Rota does not have any armed forces. Of the total potential labor force, 72 percent (1,591) were employed; 6.6 percent (145) were unemployed, and 21.4 percent (473) were not seeking employment.

2.2.2.3 Personal Income

According to the 2000 census, the mean household income in 1999 on Rota was \$42,524 with the median income at \$28,708. The mean and median family incomes for this period were \$40,244 and \$29,891 respectively. Rota's per capita income was \$10,326, and total personal income was approximately \$34 million.²³

There were 124 families with incomes below the poverty level in 1999 (for Rota, as for Guam, the poverty threshold in 1999 for a four-person family was \$17,029); this was approximately 23 percent of families.

2.2.2.4 Primary Economic Activity

Clothing manufacture is the dominant industry in CNMI, and most of this activity is on Saipan. Rota's economic base is primarily tourism, with no garment industry. While an accurate count of tourists visiting Rota is not available, for CNMI as a whole, 1996 was a peak tourist year with 736,117 visitors. In 2000, there were 528,597 visitors. Dollars spent by tourists totaled \$588 million in 1996 and \$430 million in 2000. Rota-specific information includes counts of hotel rooms. In 1992, there were 81 rooms, which increased to 217 in 1997, and to 243 in 1998, where it remains. This represents approximately 5.4 percent of hotel rooms in CNMI. Occupancy rates for Rota's hotel rooms were not available, but occupancy for CNMI was 85.6 percent in 1996, and 61.2 percent in 2000.

Employment information specific to Rota is available through the 2000 Census. Of the 1,591 people employed in 2000, employment in the top industry sectors was as follows: 21.0 percent in public administration; 20.4 percent in tourism related services; 12.9 percent in construction; 12.4 percent in education, health and social services; 7.2 percent in agriculture; and 6.9 percent in retail. Private sector work accounted for 62.9 percent of employment, with 35.7 percent in government work. The remainder were self employed or unpaid family workers.

Information on GIP is available only for 1999, and reflects the economy of CNMI as a whole. GIP was calculated at \$696.3 million.

²³ Population (3,283) x per capita income (\$10,326) = approximate total personal income (\$33.9 million).

2.2.2.5 Outlook for Growth and Socioeconomic Change

Economic development in Rota continues to emphasize tourism, with ecotourism as an area of potential growth because of the pristine conditions of the island relative to other islands in CNMI. The airport on Rota currently serves only small commuter aircraft but can physically accommodate jets up to the size of a Boeing 727. Plans are currently underway to expand the airport runway and terminal to meet the desired future demands of tourism.

CHAPTER 3

The Endangered Species Act

This chapter provides relevant information from the Endangered Species Act of 1973, as amended (the Act), including the role of critical habitat designation in protecting threatened and endangered species, requirements for consulting with the Service to insure that certain Federal actions do not endanger listed species or their habitats, and prohibited activities that apply to listed species.

3.1 ROLE OF SPECIES LISTING AND CRITICAL HABITAT DESIGNATION IN PROTECTING THREATENED AND ENDANGERED SPECIES

For species listed as threatened and endangered, the Act requires the Service to designate critical habitat to the maximum extent prudent and determinable. The Act defines critical habitat as the specific areas containing features essential to the conservation of a threatened or endangered species, and that may require special management considerations or protection.

For listed species, section 7(a)(2) of the Act requires Federal agencies to consult with the Service to ensure that activities they fund, authorize, permit, or carry out are not likely to *jeopardize* the continued existence of the species. The implementing regulations defines *jeopardy* as any action that would appreciably reduce the likelihood of both the survival and recovery of the species.

For critical habitat of listed species, section 7(a)(2) further requires Federal agencies to consult with the Service to ensure that activities they fund, authorize, permit, or carry out do not result in destruction or *adverse modification* of critical habitat. *Adverse modification* of critical habitat is defined as any direct or indirect alteration that appreciably diminishes the value of critical habitat for the survival and recovery of the species.

As stated in the proposed rule, "... critical habitat also provides non-regulatory benefits to the species by informing the public and private sectors of areas that are important for species recovery and where conservation actions would be most effective." "Critical habitat also identifies areas that may require special management considerations ... and may help provide protection to areas where significant threats to the species have been identified or help to avoid accidental damage to such areas."

3.2 CONSULTATION UNDER SECTION 7 OF THE ACT

In accordance with section 7 of the Act, the implementing regulations require Federal agencies to consult with the Service whenever activities they fund, authorize, or carry out may affect listed species or designated critical habitat. Section 7 consultation with the Service is designed to ensure that current or future Federal actions do not appreciably diminish the value of critical habitat for the survival and recovery of a listed species.

The Service has authority under section 7 to consult on activities on land owned by individuals, organizations, states, or local and tribal governments only if the activities on the land have a *Federal*

nexus. A *Federal nexus* occurs when the activities require a Federal permit, license, or other authorization, or involve Federal funding. The Service does not have jurisdiction under section 7 to consult on activities occurring on non-Federal lands when the activities are not Federally funded, authorized, or carried out. In addition, consultation is not required for activities that do not affect listed species or their critical habitat.

When consultations concern activities on Federal lands, the relevant Federal action agency initiates consultation with the Service. When an activity proposed by a state, U.S. territory, commonwealth, local government, or private entity requires a Federal permit or is Federally funded or carried out, the Federal agency with the *nexus* to the activity initiates consultation with the Service. For example, the Army Corps of Engineers (ACOE) is the agency that issues section 404 permits under the Clean Water Act, so it is the action agency that initiates consultation when an activity that requires a permit may affect a listed species or designated critical habitat.

The consultation begins after the Federal action agency determines that its action may affect one or more listed species or their designated critical habitat, even if the effects are expected to be beneficial, since projects with overall beneficial effects could include some adverse impacts. Consultations are frequently conducted for multiple species if more than one species is affected by the action.

The consultation between the Federal action agency and the Service may involve informal consultation, formal consultation in the case of adverse impacts, or both. Informal consultation may be initiated via a telephone call or letter from the action agency, or a meeting between the action agency and the Service. In preparing for an informal consultation, the action agency compiles all the biological, technical, and legal information necessary to analyze the scope of the activity and discusses strategies to eliminate adverse effects on listed species or critical habitat. Through informal discussions, the Service assists the action agency and the applicant, if any, in identifying and resolving potential conflicts at an early stage in the planning process, and may make recommendations, if appropriate, on ways to avoid adverse effects.

If during informal consultation the Federal action agency determines that its action (as originally proposed or revised, taking into account direct and indirect effects) “...is not likely to adversely affect...” listed species or critical habitat (*e.g.*, the effects are beneficial, insignificant, or discountable), and the Service agrees with that determination, then the Service provides concurrence in writing and no further consultation is required.

However, if the proposed action, as revised during informal consultation, is still likely to adversely affect listed species or critical habitat, the action agency must make a written request to initiate a formal consultation with the Service and submit a complete initiation package. Formal consultations, which are subject to specific time frames, are conducted to determine whether a proposed action is likely to *jeopardize* the continued existence of a listed species or destroy or *adversely modify* designated critical habitat. This determination depends on the extent to which a project may affect the species. Many variables, including the project’s size, location, and duration may influence the extent of the impact and, in turn, the determination of a “may effect” opinion.

If the Service finds, in its biological opinion, that a proposed action is *not* likely to *jeopardize* the continued existence of a listed species, or destroy or *adversely modify* the critical habitat—even

though the action may adversely affect listed species or critical habitat—then the action likely can be carried out without violating section 7(a)(2) of the Act.

On the other hand, if the Service finds that a proposed action is likely to *jeopardize* the continued existence of a listed species and/or destroy or *adversely modify* the critical habitat, then the Service provides the action agency with reasonable and prudent alternatives that will keep the action below the thresholds of *jeopardy* and/or *adverse modification*, if any can be identified.

The Service works with action agencies and applicants in developing reasonable and prudent alternatives. A reasonable and prudent alternative is one that (1) can be implemented in a manner consistent with the intended purpose of the action; (2) can be implemented consistent with the scope of the action agency’s legal authority and jurisdiction; and (3) is economically and technologically feasible. The Service will, in most cases, defer to the action agency’s expertise and judgment as to the feasibility of an alternative. Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of a project. Costs associated with implementing reasonable and prudent alternatives vary accordingly.

3.3 TAKING AND OTHER RESTRICTIONS OF THE ACT

Regardless of any *Federal involvement* and/or critical habitat designation, once a species has been formally listed as threatened or endangered, it is entitled to certain regulatory protections under the Act. First and foremost, section 9 of the Act specifically prohibits the *taking* of any endangered species of fish or wildlife (the prohibition does not extend to plants). The term *take* is defined as “...to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct.” The regulations at 50 CFR section 17.3 define “harm” to mean an act that actually kills or injures wildlife. This may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. In addition, endangered species, their parts, or any products made from them may not be imported, exported, possessed, or sold. Section 4(d) of the Act gives the Service regulatory discretion to extend the protections of section 9 to threatened species. While clearly prohibiting direct injury to individuals of a listed species, the restrictions on *takings* also apply to actions that destroy or alter the habitat of a listed species if the habitat alteration would result in harm to the species.

However, the Act allows the Service to permit *take* by private applicants that would otherwise be prohibited, provided such *taking* is “...incidental to, and not [for] the purpose of, the carrying out of an otherwise lawful activity.” Section 10(a)(1)(B) of the Act allows non-Federal parties planning activities that have no *Federal nexus*, but which could result in the incidental *taking* of listed animals, to apply for an incidental *take* permit. The application must include a habitat conservation plan laying out the proposed actions, determining the effects of those actions on affected fish and wildlife species and their habitats (often including proposed or candidate species), and defining measures to minimize and mitigate adverse effects. The Service may elect to issue an incidental *take* permit if the incidental *take* is to be minimized by reasonable and prudent measures, and implementing terms and conditions stipulated in the permit.

CHAPTER 4

Existing Protections

In addition to section 7 of the Endangered Species Act (the Act), other existing regulations and land management programs protect threatened and endangered species and their habitats on the islands of Guam and Rota. This chapter provides an overview of these protections, including other Federal, GovGuam, and CNMI protections for listed species, as well as GovGuam and CNMI land use controls affecting public and private lands. As appropriate, the information in this chapter is used in Chapter 6 to estimate the costs over and above those attributable to section 7 consultation.

4.1 FEDERAL GOVERNMENT

This section covers Federal laws and programs that would help to protect threatened and endangered species and their habitats on Guam and Rota, where applicable.

4.1.1 Sections 9 and 10 of the Endangered Species Act

Section 9 of the Act makes it unlawful to *take*, endangered species. Section 10 of the Act provides exceptions to this prohibition, including economic hardship permits and a permitting process for incidental *takes* in some cases. To obtain a permit under this provision, a conservation plan is required and must specify the following:

1. the impact which will likely result from such *taking*;
2. what steps the applicant will take to minimize and mitigate such impacts, and the funding that will be available to implement such steps;
3. what alternative actions to such *taking* the applicant considered and the reasons why such alternatives are not being utilized; and
4. such other measures that the Secretary [of the Interior] may require as being necessary or appropriate for purposes of the plan.

For an economic hardship permit, a person must have (1) entered into a contract with respect to the endangered species before the *Federal Register* publication of the Notice of Consideration of the species, and (2) document that listing of the species as endangered will cause “undue hardship” to the person. The exemption is limited to one year from the date of the *Federal Register* Notice of Consideration of the species. Rationale for undue hardship includes substantial economic loss from the inability of the person to fulfill the contract, and substantial loss to persons who had derived a substantial portion of their income from *taking* of the listed species.

Permits under section 10 of the Act include public notice in the *Federal Register* and public review.

4.1.2 Conservation Partnerships Program, Pacific Islands Fish and Wildlife Office

The Service's Conservation Partnerships Program is a collection of voluntary habitat restoration programs with the goal to restore native Pacific Island ecosystems through collaborative projects with private landowners, community groups, conservation organizations, and other government agencies. The program can provide cost-shared funds, as well as information on habitat restoration techniques, native species, Safe Harbor Agreements, additional funding sources, required permits, and potential vendors of restoration services (fence contractors, nurseries, etc.). Four sections of this program are available to support habitat protection and enhancement in Guam and Rota.

4.1.2.1 Partners for Fish and Wildlife Program

The Partners for Fish and Wildlife (PFW) Program is the Service's habitat restoration program for long-term conservation on private land. It was established to offer technical and financial assistance to landowners who wish to restore wildlife habitat on their property. PFW Programs can include:

- constructing fences to exclude feral ungulates;
- controlling the population of feral ungulates, weeds, rodents, and alien insects;
- restoring native ecosystem elements such as hydrology and micro-habitat conditions; and
- reintroducing native species.

The Service provides assistance ranging from informal advice on the location and design of potential restoration projects to cost-shared funding under a formal cooperative agreement with the landowner. If warranted, the Service also provides participating landowners with technical assistance to develop Safe Harbor Agreements that cover habitat managed for threatened or endangered species. The Agreements provide assurances to landowners that additional land, water, and/or restrictions on uses of natural resources will not be imposed as a result of their voluntary conservation actions.

Because funding is limited, the projects given the highest priority are those that manage or reestablish natural biological communities and provide long-term benefits to declining migratory bird and fish species and species that are threatened, endangered, or proposed for listing; and projects on private lands that provide expanded habitat for wildlife populations that inhabit National Wildlife Refuges.

4.1.2.2 Pacific Islands Coastal Program

The Pacific Islands Coastal Program identifies and conserves important coastal natural resources. The goals of the program are to:

- identify and prioritize coastal natural resources and threats;
- implement on-the-ground projects in partnership with others; and
- promote public stewardship of coastal fish, wildlife, plants, and their habitats.

Objectives of the program include:

- protecting and restoring coastal wetlands and uplands, anchialine pools, estuaries, coral reefs, and streams;
- preventing and eradicating invasive alien species in coastal areas;
- protecting and restoring watershed habitats for native species;
- building public support through partnerships, education, and community involvement; and
- inventorying and mapping coastal resources.

4.1.2.3 Other Habitat Restoration Programs

Other Habitat Restoration Programs include the National Coastal Wetlands Conservation Grant Program and the North American Wetlands Conservation Grant Program. In addition, the Conservation Partnerships Program seeks to provide a connection between habitat restoration projects and non-Service funding sources.

Under the Habitat Conservation Planning Assistance and Land Acquisition grant programs, which are separate from the Conservation Partnerships Program, Rota recently received \$243,904 from the Service for endangered species habitat conservation planning. The grant will fund development of a Habitat Conservation Plan related to release of public lands for agricultural homestead development, while protecting the secondary limestone forests that support the Mariana crow. The funding will also be used to support a site development plan for the Mochong cultural center.²⁴

4.1.3 Guam National Wildlife Refuge

Over 500 National Wildlife Refuges across the United States form a system of habitats managed by the Service. The Guam National Wildlife Refuge was established to protect that island's unique native plants and animals and their habitats. Most of the refuge, approximately 22,500 ac (9,105 ha), is an "overlay refuge" on lands administered by the Navy and Air Force. It hosts the last remaining colonies of the endangered Mariana gray swiftlet (*Aerodramus vanikorensis bartschi*), Mariana fruit bat (*Pteropus marianus marianus*), and Mariana crow (*Corvus kubaryi*). Wetlands in the refuge provide habitat for the endangered Mariana common moorhen (*Gallinula chloropus guami*). The Ritidian Unit of the Guam National Wildlife Refuge, owned by the Service, is located along the north coast of Guam (Figure 1-2). Ritidian Point was one of the last areas to be affected by the introduced brown treesnake and has retained nesting green sea turtles (*Chelonia mydas*) and foraging Mariana fruit bats.²⁵

In December 1993, the Service signed a Memorandum of Understanding (MOU) cooperative Agreements with the Navy and Air Force for the Establishment and Management of the Guam National Wildlife Refuge. The purpose of the MOU is to address common goals and responsibilities for the recovery of endangered and threatened species, the protection of native flora and fauna, the

²⁴ U.S. Fish and Wildlife Service News Release: *U.S. Fish and Wildlife Service Awards \$68 million in Grants to 16 States for Endangered Species Habitat Conservation Planning and Habitat Acquisition Projects*. USFWS Web site, <http://news.fws.gov/newsreleases/r9/>; accessed September 16, 2002.

²⁵ U.S. Fish and Wildlife Service Web site. *Guam National Wildlife Refuge*, http://ecos.fws.gov/cimas_98/refuge_menu.html?workspace=guam_nwr; accessed September 13, 2002.

conservation of unique ecosystems, and the maintenance of the native biological diversity of Guam. Individual Cooperative Agreements signed in 1994 between the Service and the Navy, and the Service and the Air Force, include a goal reflecting the intent of the proposed critical habitat rule. This goal emphasizes consultation with the Service to consider habitat of endangered or threatened species even if those species are extirpated, but not extinct.

As part of the MOU and subsequent Cooperative Agreements, the Navy and Air Force provide funds to the Service for partnership initiatives to protect, enhance, and restore threatened and endangered species and their habitat on Navy and Air Force land on Guam. These funds are available to manage overlay units of the Guam National Wildlife Refuge administered by the military. Overlay units on Navy land include large portions of Communications Annex Finegayan, most of Ordnance Annex, and portions of Waterfront Annex. Except for the Main Base, most of AAFB is an overlay unit. The Navy, Air Force, and Service participate in the development of annual work plans. Since the Service is a cooperator for land management, it may initiate Section 7 consultation under appropriate circumstances. Similarly, the Navy and Air Force coordinate with the Service on Federal actions that may affect their lands in the Guam National Wildlife Refuge identified as providing *essential habitat* for endangered species.

There is no National Wildlife refuge on Rota.

4.1.4 U.S. Navy and U.S. Air Force

The following relates only to Guam. There are no military installations on Rota.

4.1.4.1 Integrated Natural Resources Management Plans

The Sikes Act Improvements Act (SAIA) of 1997 required every military installation containing land and water suitable for the conservation and management of natural resources to complete an Integrated Natural Resources Management Plan (INRMP). The purpose of the INRMP is to integrate the mission of the military installation with stewardship of the natural resources found there. Each military installation that has listed species or manages critical habitat consults with the Service on its INRMP.

The Commander U.S. Naval Forces Marianas (COMNAVMARIANAS) finalized and approved an INRMP for Navy Lands on Guam.²⁶ Prepared in cooperation with Federal and GovGuam resource agencies to comply with the SAIA, the INRMP provides guidance to ensure that the Navy's mission is met without compromising natural resources present on land under Navy control on Guam. The INRMP serves as the basis for the Command's natural resources program, including budget allocation and project implementation over a five-year period. It will be reviewed and updated annually to reflect new information and policy.

The *Integrated Natural Resources Management Plan for Andersen Air Force Base, Guam, Mariana Islands* was prepared by the Service under an Interagency Service Agreement, in close coordination with Air Force 36 Civil Engineer Squadron and GovGuam. Prepared in December 1998, the INRMP

²⁶ Navy, November 19, 2001. *COMNAVMARIANAS, Final Integrated Natural Resources Management Plan for Navy Lands, Guam. Plan Duration 18 November 2001 to 17 November 2006.*

defines goals and objectives for a five-year period, establishes priorities, and describes specific projects for implementation.

As stated in the Proposed Rule, the Service has determined that no military installation on Guam has completed an INRMP that provides sufficient management or protection for the three subject species, although many of the projects described in the documents are generally beneficial to recovery of listed species.

4.1.4.2 Other Protections

Management and protection of natural resources on Navy and Air Force property are accomplished under several other mechanisms described below:

- Established in 1973, the 750-ac (304-ha) Pati Point Natural Area at AAFB supports native limestone forest in a relatively pristine state. Its focus is on research, and access is highly restricted to protect endangered wildlife, primarily the fruit bat. Physical improvements and public uses are generally not permitted.
- The AAFB Marine Resources Preserve (MRP) was established in 1993 to protect marine habitats and species. Regulations prohibit the collection of all marine organisms, except for hook and line fishing from shore in designated areas. Spear and net fishing at AAFB is prohibited.
- Land at Communications Annex Finegayan proposed for critical habitat designation is largely within the Haputo Ecological Reserve, an area protected by the Navy that was established in 1984 as a mitigation measure for the construction of Kilo Wharf.²⁷

In addition to the above, listed species are indirectly protected by operational safety constraints that control development in extensive parts of AAFB. These include airfield accident potential zones and other aviation safety clearances, and explosive safety quantity distance (ESQD) arcs emanating from the munitions storage area (MSA) and other sites. An additional indirect protection is associated with the Northern Lens, a large aquifer situated beneath AAFB, that supplies more than 70 percent of the water for the entire island. It is considered a sole source aquifer by the U.S. Environmental Protection Agency. Any development over the Northern Lens is strictly regulated.

The majority of Navy land at Ordnance Annex proposed for critical habitat designation is circumscribed by ESQD arcs and is also within the Fena watershed area. The Fena watershed is the largest freshwater body of water on Guam, and provides the majority of water to the Navy.²⁸ Development within these areas has been limited and is highly controlled because of the potentially hazardous operations at Ordnance Annex.

²⁷ Navy, November 19, 2001. *COMNAVMARIANAS, Final Integrated Natural Resources Management Plan for Navy Lands, Guam. Plan Duration 18 November 2001 to 17 November 2006.*

²⁸ *Ibid.*

4.1.5 Coastal Zone Management Act

In accordance with the Coastal Zone Management Act of 1972 (Public Law [P.L.] 94-370), the GovGuam Bureau of Planning and the CNMI Coastal Resources Management Office, as lead agencies for coastal zone management program (CZM), are responsible for conducting consistency review for Federal activities, activities that require a Federal license or permit, and Federal assistance to local governments. The coastal zone includes all non-Federal property within the territory and commonwealth, including offshore islands and the submerged lands and waters extending to three nautical miles offshore.

4.2 GOVERNMENT OF GUAM

This section covers laws and programs that are initiated and implemented by GovGuam.

4.2.1 Endangered Species Act of Guam

The Endangered Species Act of Guam (5 Guam Code Annotated, § 63201) (Guam ESA) gives the Guam Department of Agriculture (GDA) authority to protect and conserve ecosystems on Guam upon which resident endangered or threatened species depend. The Act was promulgated to develop and provide a program for the conservation and management of endangered and/or threatened species and to take steps necessary to achieve the purposes of the Federal Act.

The GDA, DAWR, is responsible for the management and conservation of plant and wildlife resources on Guam, and conducts research, investigation and listing of resident threatened or endangered species of plants and animals. The DAWR issues an annual list of endangered species, which is subject to Legislative approval. The Guam ESA list automatically incorporates and protects all species listed under the Federal Act.

With respect to any threatened or endangered species of plants or animals of Guam and the United States, it is unlawful to:

- import or export any such species to or from Guam and its territory;
- *take* any such species within Guam and its territory;
- possess, process, sell or offer for sale, deliver, carry, transport or ship any such species; and
- violate any regulation or rule pertaining to the conservation, protection, enhancement or management of any designated threatened or endangered species.

Exceptions to this rule may apply to any person who already has possession of such plants or wildlife at the time the provision was enacted into law.

4.2.2 Environmental Assessments and Impact Statements

The Guam Environmental Protection Agency (GEPA) is responsible for providing a unified, integrated, and comprehensive territory-wide program of environmental protection and procedures. Guam Executive Order 96-26 requires that an Environmental Assessment (EA) or Environmental Impact Statement (EIS) be prepared for all applications for conditional use, zone change, variance, subdivision approval, golf course development, work in wetlands, or aquaculture facility

development submitted to the Guam Land Use Commission (GLUC) or Guam Seashore Protection Commission (GSPC).

GEPA has established minimum requirements for the preparation of EA/EIS documents. For biological resources, GEPA guidelines call for biological surveys, ecosystem impact analyses, and proposed mitigating measures. The EA/EIS requirements and guidelines apply to development projects in all zoning districts.

4.2.3 Land Management

4.2.3.1 Public Conservation Lands

The First Guam Legislature recognized the need to preserve and protect the natural resources of Guam and mandated, under Section 13301, Chapter IV, Title XIV, Government Code of Guam, that:

"Any areas or parcels of government real property which are not suitable for economic use or which, in the interest of soil or water conservation or erosion control should not be available for private use or ownership may be set aside...[for] a program for the use and improvement of such lands, which program shall be directed towards protecting soil and water resources of Guam."

This statute resulted in the Guam Department of Land Management (DLM) surveying a number of government parcels as Conservation Reserves No. 1 through 5 in 1955, and registering them as such in 1972-1973.

In 1956, P.L. 3-103 created Section 12350 of the Government Code, which gave Legislative recognition to the conservation areas established by GovGuam:

“Reservations. The Department [of Agriculture], in cooperation with other agencies of the government, shall control and manage land and water areas which have been set aside by the government of Guam as conservation areas. Such control and management shall have as its objective the preservation of natural soil and water conditions and native plants and animals of the general area. Consistent with this objective, the Director [of Department of Agriculture] may establish and enforce rules for the use of conservation areas for recreational, educational and economic purposes.”

In 1975, P.L. 12-209 created the Department of Parks and Recreation and transferred jurisdiction over the government's Conservation Areas to the newly created department. It also created the Guam Territorial Parks System.

In 1982, P.L. 16-62 reestablished the authority of the GDA over Conservation Reserves by creating a system of joint jurisdiction with the Department of Parks and Recreation.

The Guam Territorial Parks System is composed of Natural Preserves, Conservation Reserves, Territorial Parks, Community Parks, Community Recreation Facilities, and Historic Sites, which are defined in Title 21 Guam Code Annotated, Section 77110 as:

- a. Natural Preserves, which are to remain unimproved;
- b. Conservation Reserves, which may be improved for the purpose of making them accessible to the public in a manner consistent with the perpetuation of their natural features as well as modification through sound forestry and wildlife practices that will enhance and protect the natural resources;
- c. Territorial Parks or Community Parks, which may be improved for the purpose of providing public recreational facilities in a manner consistent with the preservation of their natural features;
- d. Territorial Recreation Facilities or Community Recreation Facilities, which may be improved for the purpose of providing public recreation facilities; and
- e. Historical and Pre-Historical Objects and Sites.

In 1993, P.L. 22-18 was enacted to reserve public lands for specific government purposes, and the lands not designated were made available for the purpose of the Chamorro Land Trust Commission (CLTC) (P.L. 22-18). Section 3(c) of the P.L. 22-18 required the Departments of Parks and Recreation and the GDA to develop a comprehensive integrated master plan that clearly identifies, designates, and establishes any proposed park, conservation area, wildlife refuge, historic site, and natural preserve on government lands. On April 15, 1999, the two departments jointly submitted a *Master Plan for Park and Conservation Land* (MPPCL) to review current and future GovGuam lands for park values and to amend the Guam Park System inventory, based on updated information.²⁹

The MPPCL includes an inventory of Government-controlled public lands that are identified as Natural Preserves, Conservation Reserves, Territorial Parks, Community Parks, Territorial Recreation Facilities, Community Recreation Facilities, and Historic Sites that make up the Guam Park System. Only the Natural Preserves and Conservation Reserves categories are relevant to critical habitat, and are described below.

Natural Preserves

The MPPCL lists 12 GovGuam-controlled Natural Preserves totaling 912 ac (369 ha), which by definition are to be left in their natural unimproved state. Two of the listed areas, Anao (Lot 7146, Yigo) and Falcona Beach (Lot 10162, Dededo), are within the proposed critical habitat boundary in northern Guam.

Conservation Reserves

The MPPCL lists 21 GovGuam-controlled Conservation Reserves totaling approximately 4,127 ac (1,670 ha), including 1,583 ac (641 ha) of submerged land. One listed area, Lujuna (Lot 7163 [Part], Yigo), is within the proposed northern Guam critical habitat boundary. Another listed area, Tinechong (Lot 414, Talofofo), abuts the proposed southern Guam critical habitat boundary.

²⁹ P.L. 24-89 removes the word “territory” from all Government of Guam documents. Hence, “Guam Territorial Parks System” was renamed “Guam Park System.”

Although not listed in the MPPCL, the Bolanos Conservation Area is within the proposed Southern Guam critical habitat boundaries. Lots 507, 508, and 509 in the vicinity of Mount Bolanos are owned by GovGuam.

4.2.3.2 Private Lands and Zoning

Guam's Zoning Law (P.L. 1-88, Title 18, Guam Code Annotated) established regulations for private land development in order to encourage the most appropriate uses of land; provide adequate open spaces around buildings; prevent undue concentration of population; assure adequate provisions for schools, parks, recreation and other infrastructure; and control the types of development that would create a nuisance and/or health and safety hazard. Private properties on Guam are divided into the following eight zones:

"A"	Agricultural (Rural) Zone
"R-1"	One-Family Dwelling Zone
"R-2"	Multi-Family Dwelling Zone
"C"	Commercial Zone
"P"	Automobile Parking Zone
"M-1"	Light Industrial Zone
"M-2"	Heavy Industrial Zone
"H"	Resort Hotel Zone

These zone symbols and their boundaries are depicted on zoning maps at the Planning Division of the DLM. The zoning maps, however, do not cover the entire island. Zone designations for land areas outside the zoning maps are determined and certified by the DLM. Each zone has permitted uses and conditional uses as well as height limitations and yard setback restrictions. Land use and development in all zoned areas are subject to DLM regulations, including zoning and building code regulations. If a proposed development is a permitted use and complies with the zone's regulations, GLUC review and approval is not necessary.

In addition to permitted uses in each of the eight zones, conditional uses are allowed by the GLUC. An application for a proposed conditional use is analyzed in terms of the project's compatibility with existing or planned uses.

The GLUC is authorized to grant variances to land use laws, which may allow extension of a building or use into an adjoining zone; addition of a non-conforming structure; modification of height and density requirements; changes in parking requirements; and other variances which are consistent with the intent of the zoning, subdivision and other land use laws.

For uses other than those permitted or conditionally permitted, the developer must seek approval from the GLUC via Zone Change, Conditional Use, or Variance applications. Before developer-initiated GLUC actions are approved, developers are required to submit an Environmental Assessment. As described previously, the EA must address impacts of the project on rare, threatened, or endangered species or their habitat, and mitigate any adverse impacts.

Most of the non-military proposed critical habitat areas are zoned "A," with a few "R-1" parcels. These zones are described as follows:

- **Agricultural Zone - "A"**

The term "Agricultural" zone is a misnomer because this zone includes all lands not otherwise categorized, regardless of the agricultural quality of the land. The designated "A" zone includes land not suitable for farming or ranching such as gulches, steep hillsides, rocky outcrops, and cliffs.

Permitted uses in the "A" zone include the following:

1. Single-family dwellings and duplexes
2. Farming and fisheries
3. Accessory facilities for any of the above uses

Conditional uses allowed in the "A" zone include:

1. Parks, playgrounds and community centers
2. Biological gardens
3. Schools and churches
4. Hospitals, sanitariums, and institutional uses
5. Cemeteries
6. Recreational use including golf courses, cockpits, marinas, beaches, swimming pools, and accessory residential and commercial use
7. Extractive industry
8. Utilities and public facilities
9. Wholesale and retail stores, shops and businesses
10. Automobile service stations, including service shops
11. Accessory uses and structures for the above

- **Single-Family Dwelling Zone - "R-1"**

Permitted uses in the "R-1" zone include:

1. Single-family dwellings
2. Gardening and the keeping of pets for noncommercial purposes
3. Uses customarily accessory to any of the above uses including home occupation and private parking areas with accessory buildings and structures

Conditional uses allowed in the "R-1" zone include:

1. Duplexes
2. Schools and churches
3. Parks, playgrounds and community centers
4. Health service office, outpatient with laboratory
5. Utilities and public facilities

4.2.3.3 Seashore Development

The Guam Territorial Seashore Protection Act provides for the protection of natural, scenic, and historical resources of the Seashore Reserve for the enjoyment of present and future generations. This Act provides a review process to assure that:

- access to beaches, recreational, and historical areas are maintained;
- ocean views from the highway are not obstructed;
- wildlife preserves and adequate public recreation areas are reserved;
- adequate provisions are available for solid waste and sewage disposal; and
- minimal dangers from floods, landslides and erosion are created as a result of development.

The Seashore Protection Act restricts development on land and water seaward to the ten-fathom contour and inland ten meters from the mean high water mark or to the inland edge of public right-of-way, whichever is nearer. The Seashore Reserve excludes Cabras Island and those villages in which residences were constructed along the shoreline prior to March 12, 1974.

Approval for any development within the Seashore Reserve must be obtained from the GSPC. Before developer-initiated actions are approved, developers are required to submit an EA. As described previously, the EA must address the impacts of the projects on rare, threatened, or endangered species or their habitat, and mitigate any adverse impacts.

4.3 CNMI

4.3.1 Coastal Resources Management Regulations

The Coastal Resources Management (CRM) Office was established in 1983, under P.L. 3-47, to promote the conservation and wise development of coastal resources. Among its many duties, the CRM is responsible for administering all programs and receiving all funding provided by the Federal government for coastal resources management related programs including CZM consistency research for Federal actions. It also coordinates the coastal permit process.³⁰

A coastal permit from CRM is required whenever projects are proposed wholly or partially within an Area of Particular Concern (APC), or which constitutes a major siting. An APC is a geographic area subject to special management. Five APCs have been identified:

- Shoreline APC - area between the mean high water mark and 150 ft (46 m) inland.
- Lagoon and Reef APC - The area extending seaward from the mean high water mark to the outer slope of the reef.
- Wetlands and Mangrove APC - Those areas permanently or periodically covered with water and where species of wetland or mangrove vegetation can be found.
- Port and Industrial APC - Those land and water areas surrounding the commercial ports of Saipan, Tinian, and Rota.

³⁰ CNMI, Coastal Resources Management Web site. *What is CRM?*, <http://www.crm.gov.mp>; accessed September 16, 2002.

- Coastal Hazards APC - Those areas identified as coastal flood hazard zones in the Federal Emergency Management Act Flood Insurance Rate Maps.³¹

A major siting means any proposed project with potential to directly and significantly impact coastal resources, including but not limited to:

- energy related facilities
- wastewater treatment facilities
- transportation facilities
- harbor structures
- landfills and incinerators
- disposal of dredged materials
- quarries
- dredging and filling in marine or fresh waters
- point source discharge of water or air pollutants
- shoreline modifications
- projects with potential for significant adverse effects on submerged lands, groundwater recharge areas, historic/cultural sites, designated conservation areas, recreational areas and endangered or threatened species habitats
- major recreation, urban, or government developments
- agriculture facilities
- projects that may cause underground injection of hazardous wastes
- projects that have a peak demand of 500 kilowatts per day and/or 3,500 gallons per day (13 cubic meters per day).

Projects within the APCs must file for a Minor Permit or Major Sittings Permit. The type of permit required is determined by the project and its potential to significantly affect coastal resources. Minor permits are issued for projects such as landscaping or beautification, single-family home additions, strip clearing for site surveying or construction. Major Sittings include projects such as earth-moving activities, home construction, hotel construction, and road construction. Major siting permit applications are reviewed by the Department of Lands and Natural Resources (DLNR), Division of Environmental Quality, Department of Public Works, Department of Community and Cultural Affairs-Division of Historic Preservation, Commonwealth Utilities Corporation, the Department of Commerce, and the CRM office.

³¹ CNMI, Coastal Resources Management Web site. *Areas of Particular Concern (APCs)*, <http://www.crm.gov.mp/apc's.htm>; accessed September 15, 2002.

4.3.2 Fish, Game, and Endangered Species Act

The Division of Fish and Wildlife (DFW), within the DLNR, was established to protect endangered species and critical habitats for such species under P.L. 2-51, which was adopted in 1981. Provisions of the law include the following:

- determine status and requirements for survival of resident species of fish, wildlife, or plants;
- ensure the survival of endangered and threatened species, which may include designation of critical habitat;
- acquire land or aquatic habitat, or easements thereon, as necessary to carry out the purposes of the Act;
- accumulate necessary data on fish, game, and endangered and threatened species for statistical research purposes; and
- provide for enforcement measures with fines up to \$5,000 for *taking* of endangered or threatened species.

The DFW has an Enforcement Section that carries out the law, and Conservation Officers are deemed law enforcement officers and address hunting and fishing licence violations as well as endangered species violations. In addition, DFW supports research on fish and wildlife species and on critical habitat, and supports public education efforts for these topics. Current DFW projects include research on the Mariana fruit bat to determine population size, and bird surveys of forest and sea birds in Saipan and Rota.³²

4.3.3 Conservation Areas

There are three protected areas within or adjacent to proposed critical habitat on Rota: Sabana Protected Area, I Chenchon Bird Sanctuary, and Afatung Wildlife Management Area, a commonwealth forest (Figure 1-3). The DFW is responsible for management of the Sabana Protected Area and the I Chenchon Bird Sanctuary.³³ The DLNR Division of Forestry is responsible for management of the Afatung Wildlife Management Area.³⁴

The Sabana Protected Area covers much of the Sabana Plateau (Figure 1-3). A draft management plan was developed in 1996 for the area, but this does not specifically address conservation of the Mariana crow. In addition, activities that could affect the crow and crow habitat, such as forest clearing or hunting of non-protected bird species, are not prohibited by the draft plan. The 1996 draft plan has not been finalized or implemented.

The I Chenchon Bird Sanctuary covers 445 ac (180 ha) on the south east side of Rota (Figure 1-3). This area has been surveyed, but no management plan has been developed for it.³⁵

³² CNMI. Division of Fish and Wildlife Web site. *Homepage*, <http://www.dfw.gov.mp>; accessed September 16, 2002.

³³ CNMI. Division of Fish and Wildlife Web site. *Hunting Regulations*, <http://www.dfw.gov.mp/wildlife.htm>; accessed September 17, 2002.

³⁴ Personal communication between Ms. Tina de Cruz, DLNR CNMI, and Ms. Jane Dewell, Belt Collins, September 23, 2002.

³⁵ *Ibid.*

The Afatung Wildlife Management Area, which extends from Puntan Malilok to Puntan Haina (Figure 1-3), is managed as a commonwealth forest. No management plan has been developed for this area.³⁶

³⁶ *Ibid.*

CHAPTER 5

Economic Analysis Approach

The assumptions and methodology used to evaluate the potential economic impacts resulting from the proposed designation of critical habitat are described herein. Findings are presented in Chapter 6.

5.1 ASSUMPTIONS

Time Horizon for the Analysis. A 10-year time horizon is used to identify possible activities and to evaluate costs. This period of time represents a reasonable planning period for specific activities and future considerations. Beyond 10 years, specific plans are generally not available.

Project, Land Uses, and Activities Subject to Analysis. This economic analysis focuses on identifying the effects of proposed critical habitat on “reasonably foreseeable” projects, land uses, and activities. For the purposes of this analysis, reasonably foreseeable projects, land uses, and activities are those that are:

- currently authorized, permitted, or funded;
- proposed in plans currently available to the public; or
- projected or likely to occur within the next 10 years based on (a) recent economic or land use trends, development patterns, evolving technologies, competitive advantages, etc., and (b) limits imposed by land use controls, access, terrain, infrastructure, and other restrictions on development.

5.2 METHODOLOGY

A systematic approach was used to collect and evaluate data for this economic analysis. This approach involved identifying potentially affected parties, conducting interviews, and evaluating the data. The methodology is described below.

5.2.1 Data Collection

5.2.1.1 Guam

Using ArcView® Geographic Information System (GIS), the proposed critical habitat areas prepared by the Service’s Pacific Islands Fish and Wildlife Office were overlain with parcel boundaries obtained from GovGuam’s Bureau of Planning. Parcels encompassed by, land-locked by, or intersecting the proposed critical habitat areas were identified and used to search for respective land owners and managers at GovGuam’s Division of Land Management (DLM) and GovGuam’s Department of Revenue and Taxation (DRT). Ownership information and mailing addresses are based on what was available at the DLM and DRT in July of 2002.

The list of landowners and managers identified from the search of DLM and DRT records served as the mailing list for the letters or memorandums used to request meetings. Meetings were conducted in person during the week of August 5, 2002, or via telephone with every person that responded. A total of nine meetings and two telephone interviews were conducted.

Each meeting generally began with the interviewer offering the following information:

- purpose of the meeting,
- description of the proposed critical habitat designation,
- applicability (*Federal nexus*), and
- description of the possible implications.

Discussion followed to obtain responses to the questions provided below. For in-person interviews, these questions were provided in writing to facilitate data collection:

1. What are the existing land uses/activities on potentially affected property that you oversee? If information is available in existing documents, please identify documents.
2. In the next 10 years, through 2012, are plans to change existing land uses/activities being considered? If so, describe changes.
 - a. At what stage of the planning or development process is the proposed change in, *e.g.*, concept phase, preparing applications for permits and approvals, etc.?
 - b. If change is in the concept phase only, what is the feasibility of the proposed change given market conditions and other constraints?
3. Describe past section 7 consultations for existing land uses/activities.
 - a. For past section 7 consultations, did the affected area include those that were not inhabited by the listed species, but likely to provide suitable habitat (*unoccupied* areas)?
 - b. If *unoccupied* areas are present, proposed designation of critical habitat would require section 7 consultation. What are the anticipated effects on existing land uses/activities, including costs?
4. Do you feel the proposed designation of critical habitat and requirement to consult under section 7, whether or not listed species are present, will affect future land use/activities?
 - a. If so, what possible project modifications could be suggested to satisfy Endangered Species Act concerns?
 - b. What are the associated costs of these project modifications?
 - c. What are the current costs for conducting biological surveys?
5. Areas where listed species may be present are indicated in the accompanying map. Are there areas that you feel should be eliminated, and if so, why? Justification should include economic loss, inability to meet objectives, and other hardships.
6. What are the benefits of the proposed designation of critical habitat? For example, will it assist in managing areas you oversee?

The interviewers allowed for deviations in the structure of each meeting, which in turn allowed interviewees to provide contextual information, important in understanding their responses and opinions.

5.2.1.2 Rota

Using ArcView® GIS, Mariana crow habitat identified by the Service's Pacific Islands Fish and Wildlife Office, was overlain with parcel boundaries obtained from the Service. Because most of the island of Rota is comprised of publically owned lands, meetings were requested with representatives from CNMI and Rota government offices. Representatives from the following offices attended the meetings:

- Department of Lands and Natural Resources
- Coastal Resources Management Office
- Marianas Public Lands Authority
- Governor's Office
- Chairman of the Rota Delegation
- The Mayor of Rota
- Legal Counsel to the Mayor of Rota
- Mayor's Office

A total of three meetings were conducted in person on August 8 and 9, 2002. Each meeting generally began with the interviewer offering the following information:

- purpose of the meeting,
- description of the proposed critical habitat designation,
- applicability (*Federal nexus*), and
- description of the possible implications.

Discussion followed to obtain responses to the following questions, which were provided in writing to facilitate the interview.

1. What are the existing land uses/activities on potentially affected property that you oversee? If information is available in existing documents, please identify documents.
2. In the next 10 years, through 2012, are plans to change existing land uses/activities being considered? If so, describe changes.
 - a. At what stage of the planning or development process is the proposed change in, *e.g.*, concept phase, preparing applications for permits and approvals, etc.?
 - b. If change is in the concept phase only, what is the feasibility of the proposed change given market conditions and other constraints?
 - c. What is the estimated revenue anticipated from the lease of the subject property?
3. Describe past section 7 consultations for existing land uses/activities.
 - a. For past section 7 consultations, did the affected area include those that were not inhabited by the listed species, but likely to provide suitable habitat (*unoccupied* areas)?
 - b. If *unoccupied* areas are present, proposed designation of critical habitat would require section 7 consultation. What are the anticipated effects on existing land uses/activities, including costs?

4. Do you feel the proposed designation of critical habitat and requirement to consult under section 7, whether or not listed species are present, will affect future land use/activities?
 - a. If so, what possible project modifications could be suggested to satisfy Endangered Species Act concerns?
 - b. What are the associated costs of these project modifications?
 - c. What are the current costs for conducting biological surveys?
5. Areas where listed species may be present are indicated in the accompanying map. Are there areas that you feel should be eliminated, and if so, why? Justification should include economic loss, inability to meet objectives, and other hardships.
6. What are the benefits of the proposed designation of critical habitat? For example, will it assist in managing areas you oversee?

5.2.2 Data Analysis

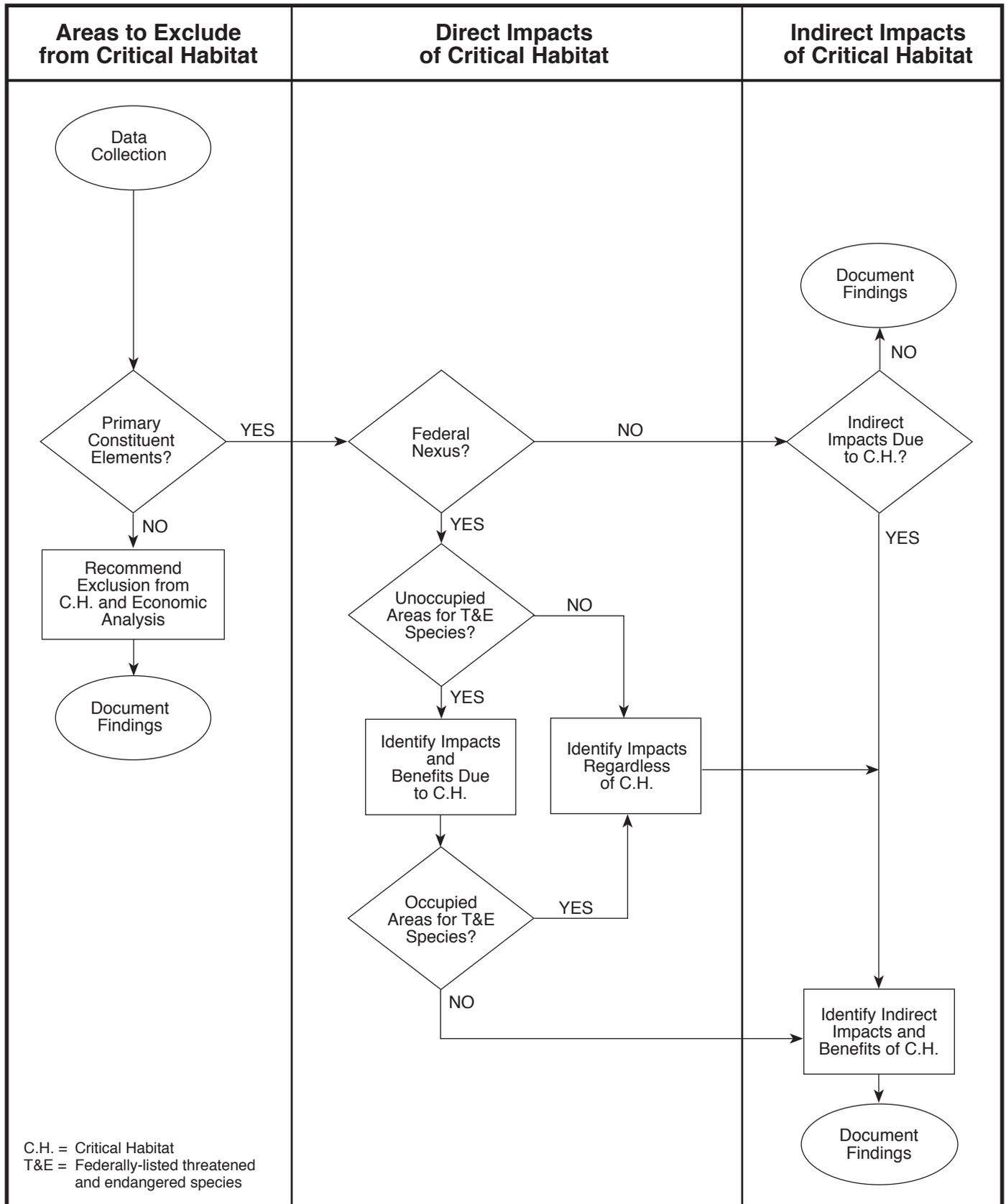
Figure 5-1 shows the steps used in the data analysis process to identify potential economic impacts, direct and indirect, associated with the section 7 listing and critical habitat provisions of the Act. A discussion for each of the major steps follows.

5.2.2.1 Primary Constituent Elements

Primary constituent elements are physical and biological features that are essential to the conservation of the species and that may require special management considerations and protections. As described in Section 1.2.1, these elements include considerations such as space for individual and population growth and for normal behavior, food, cover or shelter, and sites for nesting and rearing of offspring.

The critical habitat provisions of section 7 do not apply to the operation and maintenance (O&M) of existing man-made features and structures because these features and structures typically do not contain, and are not likely to develop, *primary constituent elements*. Examples of man-made features and structures include buildings, roads, telecommunications equipment, and arboreta and gardens. Accordingly, O&M of man-made features and structures are not considered further in this analysis.

Site interviews with land owners and managers provided updated or more detailed information about the land parcels. Land that proved to lack *primary constituent elements* were eliminated from critical habitat and not included in this economic analysis.



**Figure 5-1
DATA ANALYSIS PROCESS**

Draft Economic Analysis of Proposed Critical Habitat Designations for Threatened and Endangered Species on Guam and Rota

5.2.2.2 Federal Involvement

Projects in areas containing *primary constituent elements* were evaluated for their potential to involve Federal authorization, funding, or action (*Federal involvement*). Projects meeting these criteria, referred to as projects with a *Federal nexus*, require section 7 consultation³⁷ with the Service. Generally, only those projects with a *Federal nexus* are expected to be restricted by the designation of critical habitat.

Projects or activities that do not involve a *Federal nexus* are identified as such, and then documented as projects for which there are no section 7 requirements and associated project modifications. For completeness, information pertaining to the presence of Federally listed, threatened and endangered species is also presented in this report. If other effects due to critical habitat designation are expected, unrelated to section 7, further analysis is provided in the indirect costs section of Chapter 6.

For projects or activities that involve a *Federal nexus*, the reasons for the nexus are presented, and the analysis identifies whether or not the activity is in an area *occupied* by Federally listed threatened and endangered species (see Section 5.2.2.3).

5.2.2.3 Presence of Federally Listed Species

For each project or activity area, the presence of Federally listed species under the Act is identified. Areas where a particular species is present are considered *occupied* areas.

The subject species for this critical habitat analysis were first identified. After that, any other Federally listed species were identified. This information is important in determining the incremental effects attributed to the proposed designation of critical habitat.

5.2.2.4 Identification of Costs and Benefits

The costs of section 7 consultations and project modifications were evaluated by considering the following:

- existing protections (Chapter 4), such as the effects of existing statutes, regulations, or policies not attributable to section 7 and critical habitat provisions;
- quantity and nature of the consultations, *e.g.*, informal or formal;
- changes that are likely to occur in items such as project designs, schedules, and activities; and
- project modifications and costs due solely to the critical habitat provision of section 7 (as opposed to the listing provisions).

³⁷ Section 7 consultations are carried out through Federal agencies. When projects concern an activity on Federal lands, the relevant Federal agency consults with the Service. When the activity involves an activity proposed by a U.S. territory, commonwealth, or private entity, the Federal “action agency” for the activity consults with the Service.

Benefits such as species preservation were evaluated, in most cases, on a qualitative basis. A qualitative discussion of benefits is provided because market prices or existing economic studies on which to base values are not available (*e.g.*, economic value of preserving certain species).

5.2.2.5 Indirect Costs

Indirect costs are those that are not associated with the Act but are triggered nonetheless as a result of the critical habitat designation. For example, designation of critical habitat may result in local agencies requiring additional protection for areas that would not otherwise be subject to such protection. These impacts, along with issues reflecting local public sentiment, were identified as indirect costs.

CHAPTER 6

Economic Costs and Benefits

As noted in the Foreword, the Service may exclude an area from critical habitat designation if it determines that the benefits of excluding the area outweigh the benefits of inclusion, unless the exclusion would lead to extinction of the species. To aid in this determination, this chapter presents an analysis of the Endangered Species Act (the Act) section 7-related economic costs and benefits associated with listing the species as threatened and endangered and with designating critical habitat for the species.

The approach used in this economic analysis involves estimating both (1) the total section 7-related economic costs and benefits (also referred to as economic impacts) of the species listings and critical habitat designation, and (2) the subset of these costs and benefits that is solely attributable to critical habitat designation. As a result, for each potential impact, the analysis presents two estimates:

- **Total Section 7 Costs and Benefits.** These estimates include the economic impacts likely to occur from implementing *both* the species listing provision and the critical habitat provision of section 7 of the Act.
- **Costs and Benefits Attributable to Critical Habitat.** These estimates represent those portions of the section 7-related economic impacts that are most likely attributable to the proposed critical habitat designation but *not* to the plant listings.

The discussion and analysis of costs and benefits in this chapter is divided into the following sections: section 7 consultation history and typical costs (Section 6.1), direct section 7-related costs (Section 6.2), indirect costs (Section 6.3), potential impacts on small entities (Section 6.4), direct section 7-related economic benefits (Section 6.5), indirect benefits (Section 6.6), and summary of economic impacts (Section 6.7). For some land use activities and projects, the designation of critical habitat may generate both direct and indirect costs, or both costs and benefits, etc. As a result, the analysis of economic impacts for some land use activities and projects is split among two or more sections, as appropriate.

6.1 SECTION 7 CONSULTATIONS HISTORY AND TYPICAL COSTS

To provide a context for the analysis, this section gives a summary of past consultations and project modifications that concern one or more of the listed species. Also presented here are the costs generally associated with section 7 consultations, biological surveys, and associated project modifications. This information is used in section 6.2 to estimate future section 7-related costs.

6.1.1 History of Section 7 Consultations and Project Modifications

Records indicate that from the time the species were listed in 1984 until 2002, when critical habitat was proposed, the Service conducted 20 formal and 57 informal section 7 consultations regarding activities in the proposed critical habitat areas on Guam. In addition, six informal consultations were conducted on Rota for activities in the proposed critical habitat.

Following is a summary of the 20 formal consultations on Guam:

- Two small entity consultations involved proposals by the Urnao Resort Corporation to have contractors conduct topographic survey work on private and Federal lands for a potential access road through Navy property to private lands. The Mariana fruit bat and Mariana crow were reported to *occupy* the action areas. The Service's biological opinions³⁸ concluded that the proposed action would not result in *jeopardy* to either species. In addition, reasonable and prudent measures required in the biological opinions to avoid or minimize incidental *take* of these species did not include major modifications to the proposed action that placed a significant economic burden on Urnao Resort Corporation.
- Of the remaining 18 formal consultations on Guam involving the Mariana fruit bat, Mariana crow, and/or Guam Micronesian kingfisher, 10 were conducted on behalf of the Air Force and eight were conducted on behalf of the Navy. In all of these consultations, the Service concluded that the proposed actions would not result in *jeopardy* to these three listed species.

The 57 informal consultations on Guam involved the following:

- The proposed action concerning one small entity, the gathering of a large Chamorro family on the Guam National Wildlife Refuge, was determined not likely to adversely affect listed species, and was subject only to minor restrictions under a special use permit for the refuge.
- Four informal consultations were conducted on behalf of GovGuam agencies. One action was determined not likely to adversely affect listed species, and the second was determined to have no effect on listed species. A third was determined not likely to adversely modify the critical habitat proposed in 1991. The fourth consultation concerned technical assistance from the Service, and resulted in no regulatory action by the Service or economic burden on GovGuam. GovGuam is not considered a small entity.
- The remaining 52 informal consultations involved Federal agencies: Air Force (27), Navy (14), U.S. Department of Agriculture (4), the Service (3), ACOE (2), U.S. Department of the Army (1), and U.S. Natural Resources Conservation Service (1). Of these consultations, seven involving critical habitat proposed in 1991 were determined not likely to adversely modify critical habitat. For 38 of the consultations, the Service concluded there would be no effect on, or was not likely to adversely affect, listed species. Five consultations were requests for species lists or technical information and involved no regulatory determination. One consultation concluded with a request for more information from the Service. One consultation concluded with a determination that the proposed action, Navy training maneuvers, was likely to adversely affect the Mariana crow.

³⁸ U.S. Fish and Wildlife Service. Pacific Islands Fish and Wildlife Office log numbers 1-2-90-F-027 and 1-2-91-F-08.

Of the six informal consultations on Rota regarding the Mariana crow, none concerned a small entity and all consultations were conducted on behalf of the Government of CNMI. Four of these consultations were requests for technical assistance or species lists and resulted in no regulatory action by Service or economic burden on the CNMI Government. The remaining two actions were determined not likely to adversely affect the Mariana crow. The Government of CNMI is not considered a small entity.

6.1.2 Cost of Typical Section 7 Consultations, Biological Surveys and Project Modifications

6.1.2.1 Focus of Consultations

The proposed rule indicates that future section 7 consultations are likely to focus on projects and activities that could directly or indirectly adversely affect critical habitat, including:

- removing, thinning, or destroying Mariana fruit bat, Guam Micronesian kingfisher, or Mariana crow forest habitat by burning or other mechanical or chemical means (*e.g.*, woodcutting, grading, overgrazing, construction, road building, mining, herbicide application, etc.); and
- appreciably decreasing habitat value or quality through introduction or promotion of potential nest predators, diseases or disease vectors, vertebrate or invertebrate food competitors, invasive plant species, forest fragmentation, overgrazing, augmentation of feral ungulate populations, water diversion or impoundment, groundwater pumping or other activities that alter water quality or quantity to an extent that affects vegetation structure, or activities that increase the risk of fire.

6.1.2.2 Cost of Consultations

As discussed in Chapter 3, participants in a consultation may include the Service, the Federal applicant or Federal action agency, and possibly a non-Federal applicant. Although the Service does not charge fees for its consultations, participants in consultations normally spend time assembling information about the sites and their proposed project or activity, preparing for one or more meetings, participating in meetings, arranging for biological surveys and any associated reports; and responding to correspondence and phone calls.

For three levels of complexity (low, medium or high), Table 6-1 gives the estimated costs to those participating in consultations with the Service, as well as the Service's own costs. The estimate is based on: (1) a review of consultation records across the country related to other critical habitat rule makings; (2) the typical amount of time spent by all participants; and (3) the relevant standard hourly rates and overhead allowances for the Service, other Federal agencies, and private applicants in Hawai'i.³⁹ These are "base costs" of consultations without consideration of critical habitat.

³⁹ The costs to private applicants in Guam and Rota were assumed to be the same as they would be for Hawai'i private applicants.

Table 6-1: Estimated Cost of a Section 7 Consultation

Item	Low	Medium	High
Consultation			
Federal Action Agency or Federal Applicant	\$2,200	\$6,400	\$10,700
U.S. Fish and Wildlife Service	\$1,600	\$5,100	\$10,000
Total for Federal Agencies	\$3,800	\$11,500	\$20,700
Non-Federal Applicant (if any)	\$1,400	\$4,200	\$8,200
Total (if a Non-Federal Applicant)	\$5,200	\$15,700	\$28,900

Source: Project consultants and U.S. Office of Personnel Management, 2002 General Schedule Salary Table

As indicated in the table, consultation costs could range from as little as \$3,800 to as much as \$20,700 if only Federal agencies are involved, and from \$5,200 to \$28,900 if there is a non-Federal applicant.

For purposes of this analysis, it is assumed that some consideration of habitat is accounted for in the base costs (Table 6-1), but not to the extent needed should the proposed critical habitat rule be promulgated. To account for additional costs needed to formally consider critical habitat, additional costs above the base costs need to be assumed. Because no data were available to accurately estimate the additional costs needed to consider critical habitat, reasonable assumptions were made to attribute costs as follows. Assuming that the Federal employee conducting the consultation receives a salary of \$85,000 per year,⁴⁰ the estimated actual hourly cost to employ this individual was estimated by dividing the annual salary by the number of working hours in a year, 2,080, and multiplying by a factor of three to account for overhead and benefits. Using this approach, the estimated actual hourly cost of the Federal employee is \$122 per hour. Assuming that it may take five hours for a Federal employee to address critical habitat issues in a section 7 consultation of medium complexity, the estimated cost is \$615 (\$122 per hour multiplied by five hours). Comparing the cost of addressing critical habitat, \$610, to the estimated cost of a section 7 consultation of medium complexity for a Federal action agency or Federal applicant, which is \$6,400 (Table 6-1), the critical habitat cost represents approximately 10 percent of the base cost. Without actual data, there is no reason to apply various percentages to various complexities of, and entities involved in, section 7 consultations. Therefore, for purposes of this economic analysis, an additional 10 percent of the base costs in Table 6-1 is assumed to be needed to formally consider critical habitat under section 7.

6.1.2.3 Cost of Biological Surveys

The cost of a biological survey for a particular piece of land and a technical report on the findings varies according to a number of parameters:

- **Size of the land area.** The consultation history for a variety of listed species suggests that projects are of three sizes: small (fewer than or equal to 10 ac [4 ha]), medium (11-100 ac [6-40

⁴⁰ Estimated cost for Navy staff to assist with biological issues. Source: N46, COMNAVMARIANAS, August 7, 2002.

ha]), or large (101-500 ac [41-202 ha]). Large land areas take longer to survey and thus are more costly to survey.

- **Ease of access to the site.** Some sites can be reached easily while others can be reached only by helicopter. More remote sites are more costly to survey.
- **Type of ecosystem.** Forested areas are more difficult to survey than open areas and therefore are more costly to survey.

Based on these parameters, Table 6-2 presents estimates of the cost to survey land areas with different combinations of features. The estimates assume the following: (1) a two-person team can survey 100 ac in one day if the area is open, and 50 ac if it is forested; (2) sites having “easy” access can be reached in an hour of driving or hiking, “medium” access takes 2 hours, and “difficult” access takes a half-hour by helicopter; (3) biologist and field-assistant services are \$80 and \$50 per hour, respectively; (4) travel costs for the survey team range from approximately \$3,000 to \$7,000 for round-trip airfare from Hawai# to Guam and Rota, car rental, lodging, and per diem; and (5) helicopter time is \$700 per hour.

Table 6-2: Estimated Cost of Biological Surveys for Threatened and Endangered Birds and Mammals

Size and Location	Accessibility		
	Easy	Medium	Difficult
10 Ac, Open or Forested Area	\$7,700	\$7,800	\$8,500
100 Ac, Open Area	\$9,800	\$10,000	\$10,700
100 Ac, Forested Area	\$11,300	\$11,500	\$12,900
500 Ac, Open Area	\$18,400	\$18,900	\$22,400
500 Ac, Forested Area	\$25,900	\$26,400	\$33,400

Source: Project consultants. Based on discussions with a Hawai#-based biological consulting firm in 2002.

As Table 6-2 indicates, the cost of a biological survey could range from \$7,700 for a 10-ac (4-ha), easily accessible, open area to as much as \$33,400 for a 500 ac (202 ha), remote, forested area. The estimates are based on *average* projects of each type; specific projects of each type may require more or less survey effort than the average used in the cost estimates, depending on the characteristics. If Guam or Rota-based biological consultants conduct the surveys, the costs would be reduced by approximately \$3,000 on the low end and \$7,000 on the high end. Using the same percent increase for consultation costs, an additional 10 percent of the survey costs in Table 6-2 is assumed to be needed to address critical habitat.

6.1.2.4 Cost of Project Modifications

Project modifications resulting from section 7 consultations could include changes in project designs, schedules, land uses, activities, and programs, and are specific to the action requiring consultation. For most of the projects and activities presented in this analysis, project modifications are not known. To provide an estimate of these costs, likely project modifications are generally

assumed to be recommendations for biological monitoring. Design changes are considered unlikely because consultation should occur concurrently with project planning and development of designs.

6.2 DIRECT SECTION 7-RELATED COSTS

6.2.1 Guam

Direct costs resulting from designating critical habitat on Guam are presented herein. Areas proposed for critical habitat are illustrated in Figures 6-1a and 6-1b. Analyses are presented for the following categories of land owners: Navy, Air Force, GovGuam, and private. Additional impacts are addressed in Section 6.3.1, Indirect Costs.

6.2.1.1 U.S. Navy

Commander, U.S. Naval Forces Marianas (COMNAVMARIANAS) owns and controls the following proposed critical habitat units in Guam:

- Portion of Northern Guam Unit A, comprising approximately 1,336 ac (541 ha) of Communications Annex Finegayan, which is a portion of the Naval Computer and Telecommunications Area Master Station (NCTAMS) (2,932-ac [1,187-ha]) receiver facility and communications center. The site consists of a high ocean cliff on the west and a wooded and managed grassland plateau further inland. Facilities include large antennas, associated communications structures, housing, community support buildings, and a known distance (KD) small arms range. The Haputo Ecological Reserve Area is established here. Most of Communications Annex Finegayan is an overlay unit of the Guam National Wildlife Refuge.
- Portion of Southern Guam Unit B, comprising approximately 7,106 ac (2,876 ha) of Ordnance Annex. This facility is 8,840 ac (3,577 ha) of mostly undeveloped land surrounding a complex of ordnance storage magazines where public access is restricted. Fena Reservoir, a primary source of potable water for southern Guam, is located within the Annex. Most of Ordnance Annex is an overlay unit of the Guam National Wildlife Refuge.

The Navy's primary mission on Guam is not expected to change in the next decade, although flexibility is required to meet new challenges. Guam's use as a regional military training site is expected to increase. Hence, many of the projects and activities at Communications Annex Finegayan and Ordnance Annex during the next 10 years will be related to military training. Existing and proposed training actions in the Marianas were covered under the comprehensive *Final Environmental Impact Statement [EIS] for Military Training in the Marianas*.⁴¹ The Record of Decision (ROD), dated July 28, 1999, and the *Marianas Training Handbook, COMNAVMARIANAS Instruction 3500.4*,⁴² approved training activities and sites in Guam and CNMI. These documents

⁴¹ Department of the Navy. 1999. *Final Environmental Impact Statement for Military Training in the Marianas*.

⁴² Department of the Navy. June 2000. *Marianas Training Handbook, COMNAVMARIANAS Instruction 3500.4*.

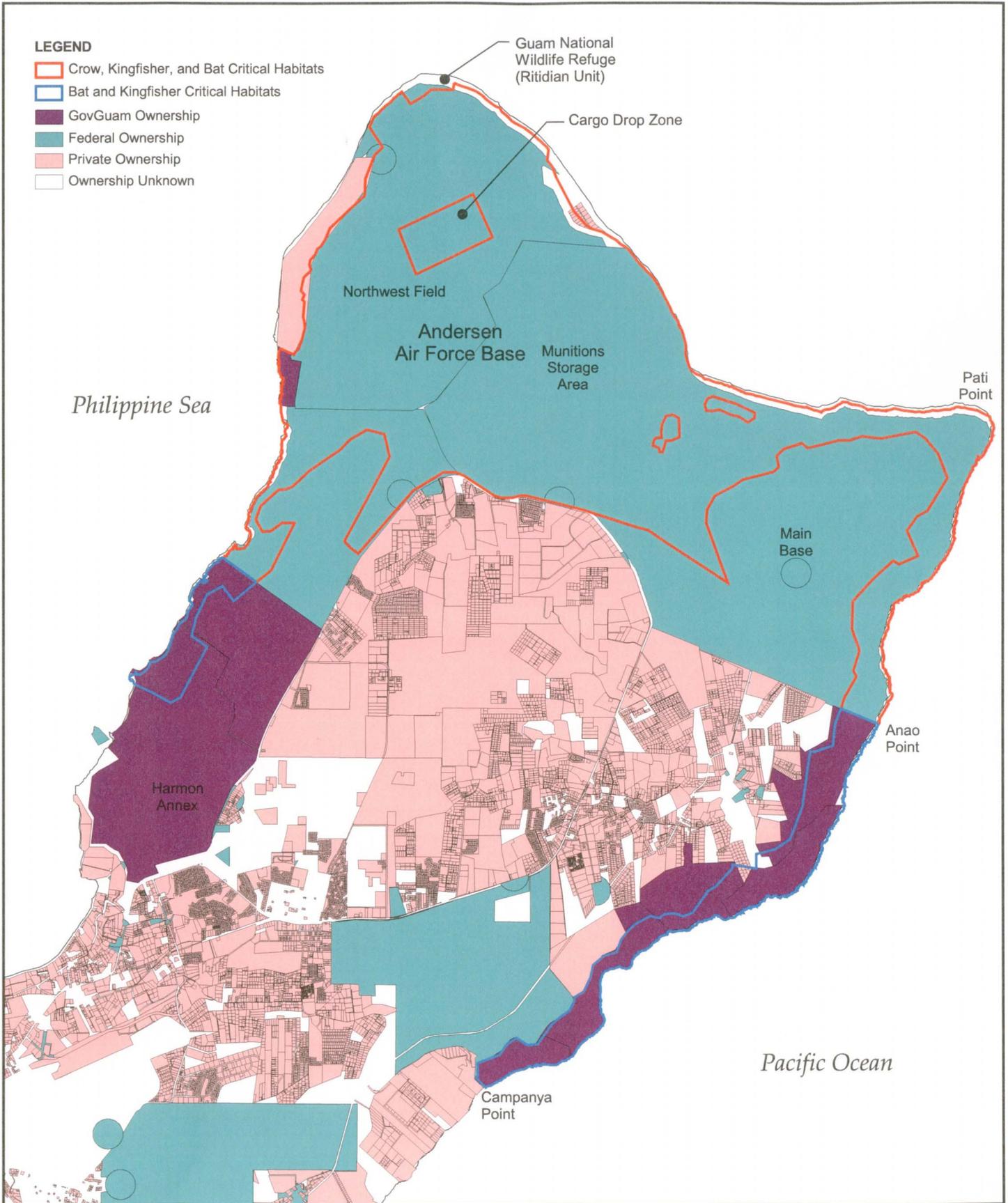


Figure 6-1a
GUAM LAND PARCELS AND CRITICAL HABITAT-- NORTH (Unit A)

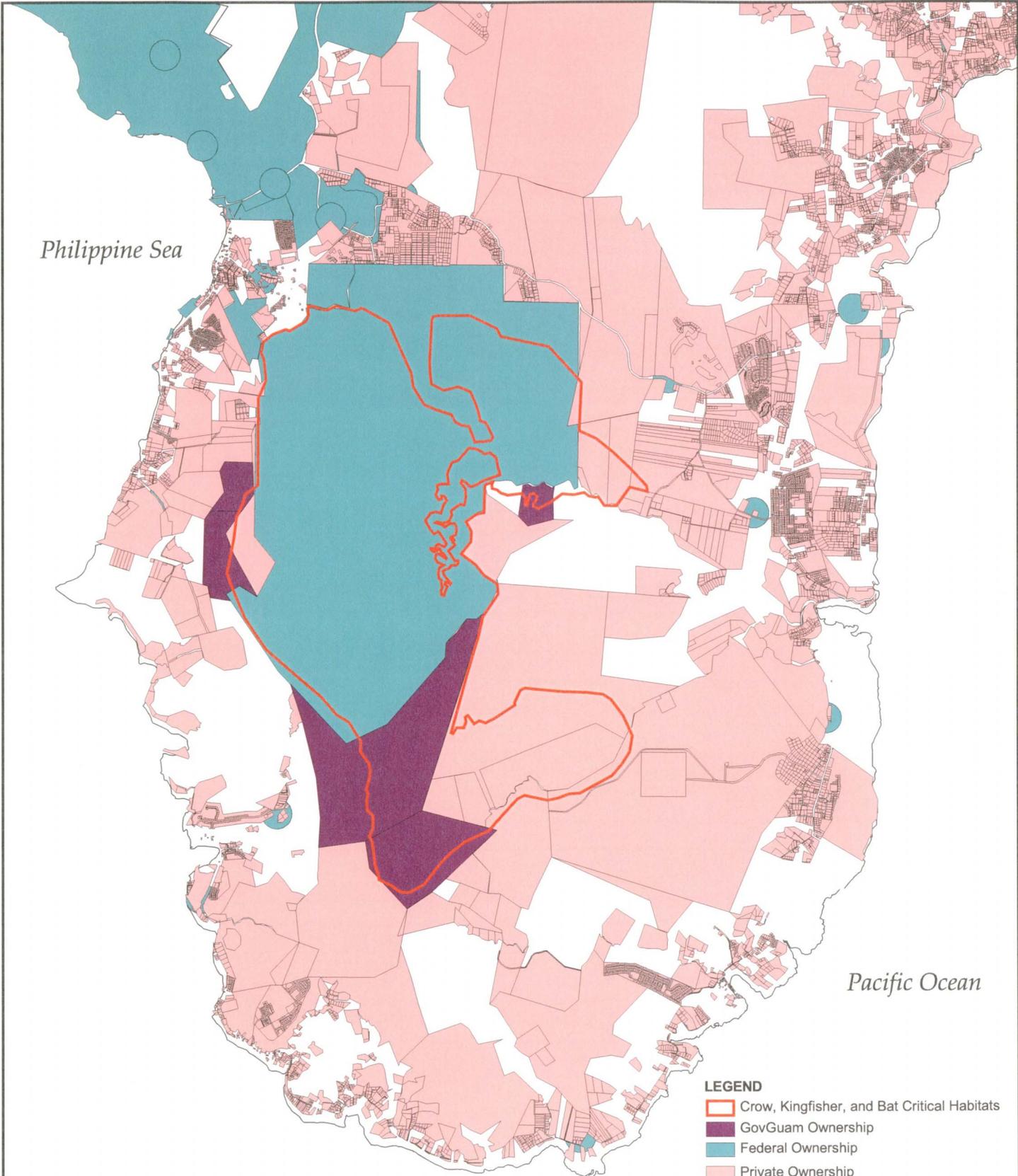
Draft Economic Analysis of Proposed Critical Habitat Designations for Threatened and Endangered Species on Guam and Rota



NORTH

0 4000 8000 Feet

SCALE IN FEET



- LEGEND**
- Crow, Kingfisher, and Bat Critical Habitats
 - GovGuam Ownership
 - Federal Ownership
 - Private Ownership
 - Ownership Unknown

Note to Service: Need revised c.h. line.

Figure 6-1b
GUAM LAND PARCELS AND CRITICAL HABITAT-- SOUTH (Unit B)



NORTH

0 4000 8000 Feet

SCALE IN FEET

Draft Economic Analysis of Proposed Critical Habitat Designations for Threatened and Endangered Species on Guam and Rota

cover all training assets in the region, including Navy and Air Force facilities in Guam and training areas in Tinian, Farallon de Medinilla, and Rota.⁴³

In addition, new training activities and facilities not covered in the Marianas Training EIS/Handbook, as well as other projects not related to military training, will be programmed at Communications Annex Finegayan and Ordnance Annex. The Navy also conducts activities at AAFB; however, the Air Force owns the property. In summary, the Navy is expected to undertake the following actions over the next 10 years within areas proposed for critical habitat designation:

- existing training activities/projects approved in the Marianas Training EIS/Handbook,
- new training activities/projects approved in the Marianas Training EIS/Handbook,
- potential training activities/projects not addressed in the Marianas Training EIS/Handbook, and
- potential activities/projects not covered above.

These actions are described below and assessed in terms of (1) total costs for section 7 consultation and costs attributable to critical habitat, and (2) total costs for anticipated project modifications and project modification costs attributable to critical habitat.

6.2.1.1.1 Existing Activities/Projects Approved in the Marianas Training EIS/Handbook

For the Marianas Training EIS, section 7 consultation was carried out on a wide variety of existing activities (continuing actions), but the January 1999 biological opinion did not address potential impacts to critical habitat. After the critical habitat rule is finalized, the Service will reinstate consultation to consider effects on critical habitat. This consultation would cover ongoing military training at Ordnance Annex, Communications Annex Finegayan, and AAFB, as well as other applicable sites. The effort would include proposed activities/projects that have not yet been implemented, such as the Ordnance Annex jungle trail described in Section 6.2.1.1.2, and would focus on critical habitat currently *unoccupied* by listed species.

Affected Area

Three training areas described in the Marianas Training EIS/Handbook are within proposed critical habitat: Ordnance Annex, Communications Annex Finegayan, and AAFB. Ordnance Annex comprises 8,840 ac (3,577 ha) in southern Guam. Approximately 7,106 ac (2,876 ha) of Ordnance Annex fall within proposed critical habitat. Communications Annex Finegayan comprises 2,932 ac (1,187 ha) in northern Guam, of which 1,336 ac (541 ha) fall within proposed critical habitat area. AAFB comprises 15,536 ac (6,287 ha) in northern Guam, of which 10,952 ac (4,432 ha) fall within proposed critical habitat area. The total area within critical habitat is approximately 19,394 ac (7,849 ha).

Federal Involvement

Communications Annex Finegayan and Ordnance Annex are owned, managed, and funded by the Navy, which is required to comply with section 7 of the Act. AAFB is owned, managed, and funded

⁴³ Rota is used as a Forward Staging Base/overnight bivouac site and for refueling boats. No maneuver training is conducted on Rota.

by the Air Force, and, hence, subject to section 7. The Marianas Training EIS/Handbook was prepared by COMNAVMARIANAS, acting for the Commander in Chief, U.S. Pacific Command.

Presence of Federally Listed Species

- Ordnance Annex: endangered Mariana fruit bat, Mariana common moorhen (*Gallinula chloropus*), and Mariana swiftlet (*Aerodramus bartschi*).
- Communications Annex Finegayan: endangered Mariana fruit bat and hawksbill turtle (*Eretmochelys imbricata*); and threatened green sea turtle (*Chelonia mydas*).
- AAFB: endangered Mariana crow, Mariana fruit bat, hawksbill turtle, and fire tree (*Serianthes nelsonii*); and threatened green sea turtle.

Costs of Section 7 Consultations and Project Modifications

The cost for consultation is expected to cover time for the Service, the Navy, and a biologist hired by the Navy. Because the project areas are *unoccupied* for at least one of the subject species, additional analysis to consider critical habitat would be needed. Considering the number and complexity of the activities that would require review for critical habitat, the cost for consultation is expected to be on the high side (Table 6-1). The actual cost should be less than that in Table 6-1 because the previous consultation already focused on Federally listed species *occupying* the area. The reinitiated consultation is estimated to be about 50 percent of the full consultation effort presented in Table 6-1; this percentage is assumed to account for time needed to review files of completed consultation and to coordinate current consultation. COMNAVMARIANAS staff estimates that the cost to contract a consultant to prepare a new biological assessment for the Marianas Training EIS would be about \$120,000,⁴⁴ all attributable to critical habitat.

Specific project modifications are difficult to predict. COMNAVMARIANAS staff has indicated that the Service typically recommends actions for a wide range of resource issues and allows the Guam DAWR a stake in implementing measures included in the biological opinions. The sole example of the Service recommending actions for a wide range of resource issues is provided in the Service's 1999 biological opinion for the Marianas Training EIS. In this opinion, the following was provided:

The Service recommends that the DOD consider funding the following conservation and recovery projects for threatened and endangered species found within the Mariana Islands: (1) efforts to eradicate feral ungulates on uninhabited northern islands, (2) surveys to assess status, distribution, and nesting/roosting areas of threatened or endangered species, (3) basic research into the life history and demography of threatened or endangered species, and (4) rate (*Rattus* spp.) eradication on uninhabited northern islands.

No evidence could be found that the Service recommended involving DAWR. For this reason, and because none of the other section 7 consultations completed between May 1990 and February 2002 indicate DAWR involvement, it is believed that DAWR involvement has been coordinated with the Navy and DAWR directly. If funding for conservation and recovery projects for threatened and endangered species were provided by the Navy, these costs could not be obtained for this report. For

⁴⁴ N46, COMNAVMARIANAS. August 7, 2002.

purposes of this report, it is assumed that biological monitoring has been initiated by the Navy at a base cost of \$10,000 per year.

In cases where DAWR staff assists in implementing mitigation measures, Navy personnel must accompany them to comply with current base security requirements; the Navy's time to assist is estimated to be 25 percent of a full time equivalent staff paid \$85,000⁴⁵ per year, or \$21,250 per year.⁴⁶ Assuming that possible project modifications resulting from reinitiating the section 7 consultation would focus on monitoring activities and not on changes to an already constructed project, the costs of project modifications, which would be fully attributable to critical habitat, is \$31,250 per year.

- Total section 7 cost: $0.50 \times (\$10,700 \text{ [Navy]} + \$10,000 \text{ [Service]}) + \$120,000 \text{ [biological survey]} = 0.50 \times (\$20,700) + \$120,000 = \$130,350$
 - A Costs attributable to critical habitat: 100 percent or \$130,350
- Anticipated total project modifications and costs: $\$10,000 \text{ [monitoring]} + \$21,250 \text{ [additional Navy staff]} = \$31,250 = \$31,250$
 - A Project modifications and costs attributable to critical habitat: 100 percent of \$31,250 or \$31,250

Over a 10-year period, the costs would include:

- 10-year section 7 costs: $0.50 \times (\$10,700 \text{ [Navy]} + \$10,000 \text{ [Service]}) + \$120,000 \text{ [biological survey]} = 0.50 \times (\$20,700) + \$120,000 = \$130,350$
 - A Cost attributable to critical habitat: 100 percent or \$130,350
- 10-year project modification cost: $\$31,250 \text{ per year} \times 10 \text{ years} = \$312,500$
 - A Cost attributable to critical habitat: 100 percent or \$312,500

The highest potential cost, difficult to quantify in dollars, would be associated with mitigation or conditions that result in less realistic training. For example, jungle warfare training that prohibits the cutting of vegetation would not be realistic and, hence, loses value. Given such a constraint, the military may choose to shift the training to another location, possibly off the island, which would increase training costs. In addition to these dollar costs, there is the indirect cost of insufficient or ineffective training, which is highly correlated with casualty rates in real combat situations (see Section 6.3.1).

6.2.1.1.2 New Activities/Projects Approved in the Marianas Training EIS/Handbook

Two new training facilities at Ordnance Annex were proposed in the Marianas Training EIS and approved in the ROD: a sniper firing range and a jungle trail with pop-up targets in the central-western edge of the Annex. Planning is currently underway on both projects. No new training facilities were proposed at Finegayan.

⁴⁵ Salary; excludes Navy cost for the individual's benefits such as health insurance.

⁴⁶ N46, COMNAVMARIANAS. August 7, 2002.

- **Sniper firing range.** This range is being designated for 7.62 millimeter (mm) sniper rifles fired by experienced marksmen. It would be used daily by small groups. There would be several shooting positions, and a variety of targets would be mounted 2,460 ft (750 m) to 3,281 ft (1,000 m) from the firing lines. Vegetation clearing would be required to develop the range.
- **Jungle trail.** This would be a 650-ft (200-m)-long trail approximately 6 ft (2 m) wide with pop-up targets installed along its length. Installation of the trail is planned in the vicinity of the sniper firing range and would involve limited hand-clearing to delineate a path intended for use by one person at a time. Targets would be dug into the soil and have elevated dirt backstops; 9 mm and 5.56 mm weapons would be used.

Virtually all of the area for these projects has been disturbed, most of it by periodic fires that have eliminated tree species and allowed sword grass and mission grass to dominate. The majority of these fires are believed to have been deliberately set by deer poachers.⁴⁷ The potential effects of the sniper firing range and jungle trail are not expected to adversely modify proposed critical habitat, considering that fires from the ranges are unlikely⁴⁸ and the trail installation would be limited to hand-clearing in this previously disturbed area.

Affected Area

Both the sniper firing range and the jungle trail would be within critical habitat. Land cleared for the sniper range would be small, discrete areas for the placement of portable targets and for marking shooting positions. The area to be hand-cleared for the planned jungle trail would be 650 ft (200 m) long and 6 ft (2 m) wide.

Federal Involvement

Ordnance Annex is owned, managed, and funded by the Navy, which is required to comply with section 7 of the Act.

Presence of Federally Listed Species

Of the three species being considered for designation of critical habitat, only the endangered Mariana fruit bat is known to *occupy* Ordnance Annex. The endangered Mariana swiftlet also occurs here.

The endangered Mariana common moorhen (*Gallinula chloropus*) is found at Fena Reservoir, which lies within the extreme end of the Surface Danger Zone (SDZ) for the proposed sniper firing range. Hills between the firing points and Fena Reservoir would protect the moorhens from projectile impacts.

⁴⁷ Gary Wiles, Guam Division of Aquatic and Wildlife Resources, May 16, 1996.

⁴⁸ As described in the Marianas Training EIS, the potential for fire from the proposed sniper range will be mitigated by ensuring no use of tracer rounds, which are typically the cause of fires at ranges, curtailing range training during drought conditions, and strict adherence to a fire prevention and response plan. In addition, a helicopter with water-hauling capabilities will be available during training sessions.

Costs of Section 7 Consultations and Project Modifications

Sniper Firing Range:

COMNAVMARIANAS plans to consult with the Service on the sniper firing range project because fruit bats are known to occur in low numbers in the area.⁴⁹ No additional mitigation is expected beyond that identified in the Marianas Training EIS, such as curtailing training during drought conditions and strict adherence to the fire prevention and response plan. Neither the sniper firing range nor the jungle trail is expected to result in *adverse modifications* to habitat.

Should section 7 consultation be initiated and completed prior to the promulgation of the critical habitat rule, COMNAVMARIANAS will have to reinitiate section 7 consultation with the Service to address the potential impact of the sniper firing range on critical habitat, including habitat for two additional species, the Mariana crow and Guam Micronesian kingfisher.

The estimated cost of reinitiating consultation is presented below, assuming an informal consultation at 50 percent of the low level of effort shown in Table 6-1. An informal consultation is assumed because the typical firing range activity that could result in adverse effects on species and adverse modifications to habitat—the use of tracers rounds that can cause fires—would not be used. Surveys have already been conducted to determine the presence of *occupied* species; no surveys are expected to be required for the consultation to consider critical habitat.⁵⁰ No project modifications of significant cost are anticipated. All of the cost would be attributable to critical habitat since consultation would not be required otherwise.

- Total section 7 (reinitiation) cost: $0.50 \times (\$2,200 \text{ [Navy]} + \$1,600 \text{ [Service]}) = 0.50 \times (\$3,800) = \$1,900$
 - A Costs attributable to critical habitat: 100 percent or \$1,900
- Anticipated total project modifications and costs: none
 - A Project modifications and cost attributable to critical habitat: none

Over a 10-year period, the costs would include:

- 10-year section 7 costs: $0.50 \times (\$2,200 \text{ [Navy]} + \$1,600 \text{ [Service]}) = 0.50 \times (\$3,800) = \$1,900$
 - A Cost attributable to critical habitat: 100 percent or \$1,900
- 10-year project modification cost: none
 - A Cost attributable to critical habitat: none

⁴⁹ The January 1999 biological opinion for the Marianas Training EIS assessed potential impacts on the Mariana fruit bat at Ordnance Annex, although only 23 incidental sightings of the fruit bat have been recorded at the Annex since 1984.

⁵⁰ Biologist, Pacific Islands Fish and Wildlife Office, U.S. Fish and Wildlife Service. October 17, 2002.

Jungle Trail:

Issues associated with the proposed jungle trail are similar to those of the sniper firing range since they are in the same general location. Unlike the sniper range, the jungle trail project is not expected to be ready for consultation until after the rule is finalized. The estimate of section 7 cost assumes an informal consultation in the low range of costs shown in Table 6-1, plus an additional 10 percent of effort to address critical habitat. Because the jungle trail is in the same vicinity as the proposed sniper range, which is an area that has been surveyed for *occupied* species, no additional biological surveys would be conducted. No additional surveys would be conducted to consider critical habitat.⁵¹ Trail design is assumed to occur concurrently with consultation, and the trail would be designed for use by one person at a time and not for vehicles or large groups. Therefore, adverse modifications on critical habitat are unlikely.

- Total section 7 cost: $1.10 \times (\$2,200 \text{ [Navy]} + \$1,600 \text{ [Service]}) = 1.10 \times (\$3,800) = \$4,180$
 - A Costs attributable to critical habitat: 10 percent of \$3,800 or \$380
- Anticipated total project modifications and costs: none.
 - A Costs attributable to critical habitat: none

Over a 10-year period, the costs would include:

- 10-year section 7 costs: $1.10 \times (\$2,200 \text{ [Navy]} + \$1,600 \text{ [Service]}) = 1.10 \times (\$3,800) = \$4,180$
 - A Cost attributable to critical habitat: 10 percent of \$3,800 or \$380
- 10-year project modification cost: none
 - A Cost attributable to critical habitat: none

6.2.1.1.3 Potential Activities/Projects Not Addressed in the Marianas Training EIS/Handbook

Future training actions in the Marianas are currently being addressed by COMNAVMARIANAS in the Guam Regional Military Training Facilities Functional Study. This facilities planning study picks up where the Marianas Training EIS and Handbook leaves off. The purpose of the study is to identify training facilities requirements and deficiencies on Navy land and to propose capital improvement projects, as well as operational measures, to primarily support activities approved in the Handbook. Given rapidly changing circumstances, the planning study also seeks to identify facilities requirements not addressed in earlier documents.

Because the study is ongoing, the results are not yet known and no new projects have been approved. If new training activities/projects are proposed at Communications Annex Finegayan and Ordnance Annex, each would require the appropriate National Environmental Protection Agency (NEPA) documentation and either formal or informal section 7 consultation with the Service. Anticipating the possibility of new training activities and associated projects, COMNAVMARIANAS plans to revise the Marianas Training Handbook during the next fiscal year, and this would require either a supplemental EIS or an EA. Hence, it is likely that new training activities/projects would be covered under an umbrella document and a single section 7 consultation. The total cost of this process is

⁵¹ *Ibid.*

estimated in the high range of section 7 consultation costs shown in Table 6-1 because it would involve assessing multiple projects at multiple sites.

Affected Area

Approximately 7,106 ac (2,876 ha) of Ordnance Annex and 1,336 ac (541 ha) of Communication Annex Finegayan are within the proposed critical habitat boundaries. Future projects could be proposed within these areas.

Federal Involvement

Communications Annex Finegayan and Ordnance Annex are owned, managed, and funded by the Navy, which is required to comply with section 7 of the Act.

Presence of Federally Listed Species

Of the three species being considered for designation of critical habitat, only the endangered Mariana fruit bat is known to *occupy* Ordnance Annex and Communications Annex Finegayan. The endangered Mariana common moorhen and Mariana swiftlet also occur at Ordnance Annex. Other listed species at Finegayan include the endangered hawksbill and threatened green sea turtles.

Costs of Section 7 Consultations and Project Modifications

It is likely that various projects in the Marianas Training Handbook revision and associated NEPA documentation would be covered in one section 7 consultation. Because multiple projects at multiple sites would be addressed, the consultation is assumed to be formal, with a cost in the high range (see Table 6-1), plus an additional 10 percent of effort to address critical habitat issues.

A biological survey is assumed to be required, which is estimated to be in the mid-range of cost for a 500-ac forested area (Table 6-2); approximately 10 percent of the base survey cost is assumed to be needed to address critical habitat.

Project modifications are unknown at this time. For purposes of this analysis, it is assumed that the biological opinion would include biological monitoring on an annual basis in a 100-ac forested area with medium accessibility (see Table 6-2). An additional 10 percent of this base cost would be needed to address critical habitat.

- Total section 7 cost: $1.10 \times (\$10,700 \text{ [Navy]} + \$10,000 \text{ [Service]} + \$26,400 \text{ [biological survey]}) = 1.10 \times (\$47,100) = \$51,810$
 - A Cost attributable to critical habitat: 10 percent of \$47,100 or \$4,710
- Anticipated total project modifications and costs: $1.10 \times (\$11,500 \text{ [monitoring]}) = \$12,650$
 - A Cost attributable to critical habitat: 10 percent of \$11,500 or \$1,150

Over a 10-year period, the costs would include:

- 10-year section 7 cost: $1.10 \times (\$10,700 \text{ [Navy]} + \$10,000 \text{ [Service]} + \$26,400 \text{ [biological survey]}) = 1.10 \times (\$47,100) = \$51,810$
 - A Cost attributable to critical habitat: 10 percent of \$47,100 or \$4,710
- 10-year project modification cost: $1.10 \times (10 \text{ years} \times \$11,500 \text{ per year [monitoring]}) = 1.10 \times (\$115,000) = \$126,500$
 - A Cost attributable to critical habitat: 10 percent of \$115,000 or \$11,500

6.2.1.1.4 Potential Activities/Projects Not Covered Above

Over the next 10 years, COMNAV MARIANAS is expected to initiate section 7 consultation with the Service on various improvements at Communications Annex Finegayan and Ordnance Annex not covered in the discussion above. These may include the construction of administrative, storage, maintenance, housing, and community support facilities, as well as utilities and other infrastructure. Additional training-related actions not addressed in the Guam Regional Military Training Facilities Functional Study may be proposed in the future.

Affected Area

Approximately 7,106 ac (2,876 ha) of Ordnance Annex and 1,336 ac (541 ha) of Communication Annex Finegayan fall within the proposed critical habitat boundaries.

Federal Involvement

Communications Annex Finegayan and Ordnance Annex are owned, managed, and funded by the Navy, which is required to comply with section 7 of the Endangered Species Act.

Presence of Federally Listed Species

Of the three species being considered for designation of critical habitat designation, only the endangered Mariana fruit bat is known to *occupy* Ordnance Annex and Communications Annex Finegayan. The endangered Mariana common moorhen and Mariana swiftlet also occur at Ordnance Annex. Other listed species at Finegayan include the endangered hawksbill and threatened green sea turtles.

Costs of Section 7 Consultations and Project Modifications

COMNAV MARIANAS staff has expressed concern that critical habitat designation may have the following cost consequences:

- The designations may require that EAs be prepared for certain Navy projects that previously could have been categorically excluded from detailed NEPA documentation. CEQ regulations state that a categorical exclusion (CATEX) will not be used if the proposed action is determined to have the potential for significant effects on endangered or threatened species or threatens a violation of Federal, state, or local law or requirements imposed for protection of the environment. Moreover, instructions in the Navy's procedures for implementing NEPA (OPNAVINST 5090.1B) state that proposed actions for which the Service would not issue a "no adverse effect" opinion for any threatened or endangered species or its critical habitat do not qualify for a CATEX. This situation, requiring an EA rather than a CATEX, would most likely occur in the case of projects located in *unoccupied* critical habitat where the proposed action could "affect" the habitat. Such projects could include military training exercises that may include fire hazards.

COMNAV MARIANAS staff estimates that contracting a consultant to prepare an EA could cost a minimum of \$20,000 to as much as \$80,000 to \$100,000 for more complex projects. This can be compared with the minimal cost for in-house staff to prepare a CATEX, estimated to be in the range of \$1,000. The NEPA process requires additional effort, including consultation with the Guam Historic Preservation Officer in compliance with section 106 of the National Historic

Preservation Act, and submittal of a CZM consistency determination with the Guam Bureau of Planning. As a consequence, project implementation would be substantially delayed. The Navy's EA process typically requires at least six months and as long as nine months, while a CATEX can be completed in a few weeks.

- There is concern that critical habitat designation would result in a higher number of section 7 consultations, possibly more formal and fewer informal consultations, or fewer "no effect" determinations. Any proposed Federal action in areas designated as critical habitat would require an informal consultation at a minimum. Project implementation may be delayed if the Service is unable to respond to the increased volume of work in a timely manner. Assuming that more than half of the Navy's land on Guam is critical habitat, consultations could increase substantially.

The Navy was previously able to request a "no effect" (what the Navy refers to as "no adverse effect") determination from the Service when it was known that individuals of the threatened or endangered species were not present on the project site. With critical habitat designation, consultation for the same project in the same location could conceivably result in a determination for critical habitat other than "no effect," which would require the Navy to prepare an EA in accordance with their procedures. While no examples of this occurrence are available for critical habitat, an example of the Navy having to prepare an EA because they could not obtain the Service's concurrence on a "no effect" determination was experienced as a result of a December 2000 informal consultation on the INRMP for Navy lands on Guam. In this case, seven listed species that do not inhabit Navy land were considered, but the Navy could not obtain a "no effect" determination from the Service.

- Additional requests due to consideration of critical habitat are anticipated from DAWR, as the Service typically involves the DAWR in their biological opinions. In addition, DAWR is typically provided a significant stake in implementing measures resulting from biological opinions. Such measures include biological monitoring, which could cost \$11,500 (Table 6-2 for a 100-ac forested area) and require Navy staff to escort DAWR biologists on Navy property.

Note: While the above mentioned implications could occur, based on the goals in the Navy's Cooperative Agreement with the Service (see Section 4.1.3), the implications should have already been realized. Hence, the associated costs may not be attributable to the designation of proposed critical habitat.

To estimate potential future costs of activities/projects not covered in previous sections, the frequency of past section 7 consultations and assumptions reflecting COMNAVMARIANAS concerns were considered. Further descriptions of past consultations and assumptions are described herein, followed by estimated 10-year costs.

The record of past consultations by COMNAVMARIANAS, both formal and informal, indicate a total of nine consultations between May 1990 and February 2002 (six formal, three informal). Pacific Division, Naval Facilities Engineering Command (PACDIV) initiated consultations for up to seven additional projects on Guam during this period, including four Base Realignment and Closure (BRAC) actions. Excluding the BRAC actions, that averages out to approximately one consultation per year.

For purposes of this study, it is assumed that the Navy would initiate a minimum of one section 7 consultation per year, for a total of 10 over the decade, and five of these consultations would be formal and require biological surveys at \$10,000 per assessment. According to COMNAVMARIANAS staff, an informal consultation is estimated to cost the Navy \$1,000 (base cost without considering critical habitat). For the Navy, the base cost for a formal consultation is estimated in the range of \$2,200 to \$10,700, or a medium cost of \$6,400 (Table 6-1). Additional effort – about 10 percent of this base cost – would be attributable to critical habitat because most of the consultation cost/time would focus on Federally listed species *occupying* the area, and to a limited extent, habitat with or without the designation of critical habitat.

Assuming that future consultations would be done during the planning stages of future projects, no significant project design modifications are anticipated. Based on consultations during the May 1990 through February 2002 period, project modifications could include providing funding for natural resource programs, as one of 13 consultations included such a recommendation. Hence, one consultation in the next 10 years is assumed to include recommendations for funding or monitoring at a cost of \$10,000.⁵²

Table 6-3: Section 7 Direct Cost Factors–Navy Projects Not Covered Elsewhere

	Unit Cost	Cost to the Navy	Cost to the Service
Informal Consultations (5)	Navy: \$1,000 Service: \$1,600	\$5,000	\$8,000
Formal Consultations (5)	Navy: \$6,400 Service \$5,100	\$32,000	\$25,500
Biological Survey (5)	\$10,000	\$50,000	\$0
Project Modifications/Biological Monitoring (1)	\$10,000	\$10,000	\$0

Over a 10-year period, the costs would include:

- 10-year section 7 cost: $1.10 \times (\$37,000 \text{ [Navy]} + \$33,500 \text{ [Service]} + \$50,000 \text{ [biological surveys]}) = 1.10 \times (\$120,500) = \$132,550$
 A Cost attributable to critical habitat: 10 percent of \$120,500 or \$12,050
- 10-year project modification costs: $1.10 \times (1 \text{ project} \times \$10,000) = 1.10 \times (\$10,000) = \$11,000$
 A Cost attributable to critical habitat: 10 percent of \$10,000 or \$1,000

⁵² The Service’s project recommendations for the Navy’s proposed field carrier landing practices at Andersen AFB included: funding a Mariana crow nest protection program, using highest minimum elevations for aircraft activity, and conducting a noise modeling assessment. Because this action was not carried out, costs for these recommendations are unavailable. For purposes of this assessment, a cost of \$10,000 is assumed.

Hunting on Navy land is not addressed above. There is no record of section 7 consultations for hunting projects or activities at Communications Annex Finegayan or Ordnance Annex, except for the INRMP. Undeveloped parts of the installations support several species of wild game and are, at the same time, essential habitat for endangered species. Because of natural resource concerns, as well as base security and safety issues, hunting is closely regulated. It is considered a management tool for damage control rather than a recreational program. Hunting is intended to control the impacts of deer and wild pigs on native forest ecosystems.

6.2.1.2 U.S. Air Force

AAFB owns and controls a portion of proposed critical habitat Unit A in Northern Guam, comprising approximately 10,952 ac (4,432 ha). AAFB is administered by 36 Air Base Wing (ABW). Facilities include runways, taxiways and aircraft parking aprons, fuel and munitions storage, administrative buildings, industrial facilities, housing, recreational facilities and open space, and undeveloped land. Excluded from the proposed designation are the Main Base, comprised of about 11,500 ac (4,500 ha), and the cleared cargo drop zone in Northwest Field. Except for the Main Base, much of AAFB is an overlay unit of the Guam National Wildlife Refuge.

The Air Force's mission on Guam is not expected to change in the next 10 years. The 36 ABW mission is to "provide the highest quality peacetime and wartime support to project global power and reach from a vital location in the Pacific." AAFB staff is aware of five projects planned in proposed critical habitat on the base: projects (a) through (d) listed below. In addition to these near-term actions, other projects are identified in the AAFB *General Plan*,⁵³ and these are addressed under item (e). Only one new training activity was proposed at AAFB in the Marianas Training EIS/Handbook—establishment of a permanent site for rapid runway repair training at Northwest Field. After the final rule is approved, COMNAVMARIANAS will have to reinitiate consultation on the effects of existing/approved training on critical habitat, including training on Air Force property. Any new training activities and associated physical improvements at AAFB would require the Air Force to prepare appropriate NEPA documentation and initiate section 7 consultation; this is addressed under item (e).

- a. On-base water supply improvements
- b. MSA bunker upgrade
- c. Brown treesnake barrier around the MSA

⁵³ Pacific Air Forces. February 1999. *Andersen Air Force Base General Plan*.

- d. Weapons storage building in the MSA
- e. Other activities/projects

These actions are described below and assessed in terms of (1) total costs for section 7 consultation and costs attributable to critical habitat, and (2) total costs for anticipated project modifications and project modification costs attributable to critical habitat.

6.2.1.2.1 Potential Activity/Project—On-Base Water Supply Improvements

This project involves development of 10 new potable water wells to replace those located at Andersen South, which is being transferred to the Marine Corps. Section 7 consultation would probably be formal because of existing endangered species (Mariana crow and Mariana fruit bat). A feasibility study is in progress. Effects on critical habitat would depend upon project design and layout. The wells could be sited to avoid habitat and pipelines installed within road right-of-ways, but the latter could be more costly if it involves installations over longer distances.

Affected Area

The geographic scope of this project is unknown at this time, so the affected acreage is also unknown.

Federal Involvement

AAFB is owned, managed, and funded by the Air Force, which is required to comply with section 7 of the Act.

Presence of Federally Listed Species

Listed species present at AAFB include the endangered Mariana crow, endangered Mariana fruit bat, endangered hawksbill turtle, threatened green sea turtle, and endangered fire tree. The first two are most likely to occur in areas considered for siting of the wells, pipelines, and related facilities.

Costs of Section 7 Consultations and Project Modifications

For purposes of estimating consultation costs, it is assumed that critical habitat would be considered in the current process and reinitiation of consultation would not be required. The base is *occupied* by Mariana crows and Mariana fruit bats. Their proposed habitat coincides with that being proposed for the Guam Micronesian kingfisher, so the level of effort to assess critical habitat for the additional species would not be substantial. Site-specific biological surveys of well locations and pipeline alignments may be required if these facilities are not limited to developed areas (Table 6-2). For purposes of this analysis, it is assumed that a biological survey would be required.

The section 7 consultation costs given below reflect the medium range shown in Table 6-1, the survey cost for a 500-ac forested area with medium accessibility in Table 6-2, and attribute 10 percent of the total base consultation cost and base survey cost to critical habitat designation. Project modifications and costs are unknown at this time since the work is only at the feasibility study phase. Because the wells and pipelines would have little or no impact during operation, ongoing monitoring would not be required.

- Total section 7 cost: $1.10 \times (\$6,400 \text{ [Air Force]} + \$5,100 \text{ [Service]} + \$26,400 \text{ [biological survey]}) = 1.10 \times (\$37,900) = \$41,690$

A Cost attributable to critical habitat: 10 percent of \$37,900 or \$3,790

- Anticipated project modifications and costs: none

A Cost attributable to critical habitat: none

Over a 10-year period, the costs would include:

- 10-year section 7 costs: $1.10 \times (\$6,400 \text{ [Air Force]} + \$5,100 \text{ [Service]} + \$26,400 \text{ [biological survey]}) = 1.10 \times (\$37,900) = \$41,690$

A Cost attributable to critical habitat: 10 percent of \$37,900 or \$3,790

- Anticipated project modifications and costs: none

A Cost attributable to critical habitat: none

6.2.1.2.2 Potential Activity/Project—MSA Bunker Upgrade

The MSA is the site of the single Mariana crow colony remaining on Guam. Operations in the MSA appear to be compatible with the crows.

Affected Area

The MSA is approximately 1,650 ac (668 ha).

Federal Involvement

AAFB is owned, managed, and funded by the Air Force, which is required to comply with section 7 of the Act.

Presence of Federally Listed Species

Listed species known to *occupy* the MSA include the endangered Mariana crow and Mariana fruit bat.

Costs of Section 7 Consultations and Project Modifications

The consultation would most likely be informal since this would involve an upgrade of existing facilities. It is assumed that no land clearing would be required and that the activities would occur in areas considered as “unmapped holes,” as defined in Section 1.2.2 of this analysis. The costs estimated below are in the low range and assume no biological survey and no project modifications because the upgrade would occur within the existing footprint of the facility in a previously disturbed area. Since the project is in a very preliminary concept stage, consultation is expected to occur after approval of the final rule.

- Total section 7 cost: $(\$2,200 \text{ [Air Force]} + \$1,600 \text{ [Service]}) = \$3,800$

A Cost attributable to critical habitat: none, an unmapped hole

- Anticipated project modifications and costs: none.

Over a 10-year period, the costs would be the same as above.

6.2.1.2.3 Potential Activity/Project—Brown Treesnake Barrier Around the MSA

This project to construct a snake barrier around the MSA is in the planning phase, with an EA funded in FY02.

Affected Area

The MSA is approximately 1,650 ac (668 ha).

Federal Involvement

AAFB is owned, managed, and funded by the Air Force, which is required to comply with section 7 of the Act.

Presence of Federally Listed Species

Listed species known to *occupy* the MSA include the endangered Mariana crow and Mariana fruit bat.

Costs of Section 7 Consultations and Project Modifications

The costs given below assume informal section 7 consultation in the low range of effort. Although some land would be cleared, it is recognized that the project would substantially benefit endangered species in the area. As such, the project is already being designed with protection of listed species as a primary goal.

- Total section 7 cost: $1.10 \times (\$2,200 \text{ [Air Force]} + \$1,600 \text{ [Service]}) = 1.10 \times (\$3,800) = \$4,180$
A Cost attributable to critical habitat: 10 percent of \$3,800 or \$380
- Anticipated project modifications and costs: none.

Over a 10-year period, the costs would be same as above.

6.2.1.2.4 Potential Activity/Project—Weapons Storage Building in the MSA

The Air Force is planning a 40,000-square-ft (3,716-square-m) weapons storage building in the MSA. Because the project is in a very preliminary conceptual stage, the site location is not known.

Affected Area

The MSA is approximately 1,650 ac (668 ha).

Federal Involvement

AAFB is owned, managed, and funded by the Air Force, which is required to comply with section 7 of the Act.

Presence of Federally Listed Species

Listed species known to *occupy* the MSA include the endangered Mariana crow and Mariana fruit bat.

Costs of Section 7 Consultations and Project Modifications

The following cost estimates are based on effort in the medium range for consultation and the need to conduct a biological survey in a 100-ac open area. Because the project is in such an early planning stage, the facility could be sited to avoid impacts on endangered species and habitat, and therefore no project modifications would be required.

- Total section 7 cost: $1.10 \times (\$6,400 \text{ [Air Force]} + \$5,100 \text{ [Service]}) + \$10,000 \text{ [biological survey]} = 1.10 \times (\$21,500) = \$23,650$
A Cost attributable to critical habitat: 10 percent of \$21,500 or \$2,150

- Anticipated project modifications and costs: none.
 - A Cost attributable to critical habitat: none

6.2.1.2.5 Other Potential Activities/Projects

During the next 10 years, the Air Force is expected to initiate section 7 consultation with the Service on various improvements at AAFB not covered in the discussion above. These may include projects identified in the base General Plan,⁵⁴ as well as new training-related actions not addressed in the Marianas Training EIS/Handbook. The record of past consultations by the Air Force indicates a total of 10 formal and 25 informal consultations for the 12-year period from 1990 through 2001, for a total of 35 consultations or about three per year.

Affected Area

Affected acreage is unknown at this time.

Federal Involvement

AAFB is owned, managed, and funded by the Air Force, which is required to comply with section 7 of the Act.

Presence of Federally Listed Species

Listed species present at AAFB include the endangered Mariana crow, endangered Mariana fruit bat, endangered hawksbill turtle, threatened green sea turtle, and endangered fire tree. The first two are most likely to occur in areas considered for siting of facilities.

Costs of Section 7 Consultations and Project Modifications

Assuming three section 7 consultations a year, the Air Force would be expected to initiate consultation on 25 activities or projects over the next decade, in addition to the five identified above. The scope of these projects is unknown, so the following assumptions are made. Using the same ratio of past formal consultations to total consultations estimated during the period from 1990 through 2002, 18 informal and seven formal consultations would be carried out in the next 10 years. Informal consultations are assumed to be in the low cost range and formal consultations are assumed to be an average of the low and medium cost ranges. Five biological surveys are assumed to be conducted at an estimated cost of \$10,000 each. Based on past consultations, the Service has recommended that the Air Force consider alternative locations and modifications to their activities, but no discrete modifications resulting in substantial costs were identified. Hence, no significant project modifications are assumed to be recommended by the Service in the next 10 years.

⁵⁴ Pacific Air Force. February 1999. *Andersen Air Force Base General Plan*.

Table 6-4: Section 7 Direct Cost Factors - Air Force Projects

	Unit Cost	Cost to the Air Force	Cost to the Service
Informal Consultations (18)	Air Force: \$2,200 Service: \$1,600	\$49,600	\$28,800
Formal Consultations (7)	Air Force: \$4,300 Service: \$3,350	\$30,100	\$23,450
Biological Survey (5)	\$10,000	\$50,000	\$0
Project Modifications/Biological Monitoring (0)	Not applicable	Not applicable	No applicable

Over a 10-year period, the costs would be:

- 10-year section 7 cost: $1.10 \times (\$69,700 \text{ [Air Force]} + \$52,250 \text{ [Service]} + \$50,000 \text{ [biological surveys]}) = 1.10 \times (\$171,950) = \$189,145$
 - A Cost attributable to critical habitat: 10 percent of \$171,950 or \$17,195
- 10-year project modification costs: none
 - A Cost attributable to critical habitat: none

Hunting is another issue worth mentioning here, although there is no record of section 7 consultations for hunting projects or activities at AAFB except in the INRMP. Undeveloped parts of the base support several species of wild game and are, at the same time, essential habitat for endangered species. Because of natural resource concerns, as well as base security and safety issues, hunting at AAFB is closely regulated. It is considered a management tool for damage control rather than a recreational program. Hunting is intended to control the impacts of deer and wild pigs on native forests ecosystems.

6.2.1.3 Government of Guam

GovGuam owns or will own the following land proposed for critical habitat designation:

- approximately 140 ac (57 ha) of the former Federal Aviation Administration (FAA) housing parcel at Ague Point. This parcel is being conveyed to GovGuam as part of the disposal of surplus Navy property identified in the Guam Land Use Plan Update (GLUP '94). This BRAC action was approved by the Secretary of the Navy in a ROD, dated March 12, 2001. The housing was damaged by Typhoon Paka in 1997 and has since been demolished; the remainder of the land is undeveloped. The parcel is within Unit A of the proposed critical habitat.
- approximately 1,319 ac (534 ha) from the southeastern boundary of the AAFB south to Campanaya Point. The primarily undeveloped forest between the cliffline and coastline of these parcels, including a portion of the Anao Conservation Area, are within Unit A of the proposed critical habitat.

- approximately 1,263 ac (511 ha) of undeveloped forested land in the Bolanos Conservation Area. These parcels are south of Ordnance Annex, and are located in Unite B of the proposed critical habitat.
- approximately 50 ac (20 ha) of land to the west of Ordnance Annex identified in the 1984 *Guam Public Land-Use Plan*⁵⁵ as Tract EA. This area is in Unit B of the proposed critical habitat.
- approximately 42 ac (17 ha) of GovGuam land to the east of Ordnance Annex, in Unit B of the proposed critical habitat.

In addition, two other parcels listed as either Natural Preserves or Conservation Reserves in the Master Plan for Park and Conservation Land (MPPCL) are within the boundaries of proposed critical habitat. These include cliffline property at Falcona Beach in Dededo (approximately 97 ac [39 ha]) and a parcel at Lujuna in Yigo (approximately 163 ac [66 ha]). These properties are within Unit A of the proposed critical habitat.

6.2.1.3.1 Potential Activity/Project—Former FAA Housing Parcel

The reuse of this parcel by GovGuam after conveyance from the Navy includes the following, as presented in the *Final Environmental Impact Statement for the Disposal and Reuse of Surplus Navy Property Identified in the Guam Land Use Plan Update (GLUP '94)*.⁵⁶

- **Residential (70 ac/28 ha).** A large residential subdivision in the area formerly occupied by the FAA housing, comprised of up to 390 units of affordable single-family housing.
- **Resort (488 ac/197 ha).** An 18-hole golf course with open space for an additional nine holes in the future, and two small hotel or bungalows (128 rooms total), in the area between Route 3 and the subdivision.
- **Parks/Recreation/Historic/Conservation (140 ac/57 ha).** Conservation or limited recreation at cliff side; neighborhood recreation facilities or facilities for the management of historic or natural features.

Affected Area

The affected area is the 140 ac (57 ha) portion designated for conservation/recreation use. Only the cliff area, proposed for parks/recreation/historic/conservation use, is proposed for critical habitat designation. Therefore, the designation would not preclude residential and resort uses on the remainder of the parcel. The timing of development would depend upon market demand.

Federal Involvement

Development of the former FAA housing parcel would most likely be accomplished by a private entity that either buys or leases the property from GovGuam. No Federal permits or funding would be required. There are no wetlands on the site.

⁵⁵ Bureau of Planning September 1984. *Guam Public Land-Use Plan*.

⁵⁶ U.S. Navy August 2000. *Final EIS for the Disposal and Reuse of Surplus Navy Property Identified in the Guam Land Use Plan Update*.

Presence of Federally Listed Species

Biological resources on this site were documented in the GLUP EIS referenced above. No species listed for protection by the Federal government or GovGuam were found on the parcel.

Costs of Section 7 Consultations and Project Modifications

No consultations or project modifications are anticipated because the development of the parcel will not involve Federal permits/funding.

6.2.1.3.2 Northern Guam Public Land

This section addresses the following areas owned by GovGuam: Anao Conservation Area, Lujuna, land between Janum Point and Campanaya Point, and Falcona Beach.

As explained in Chapter 4, Anao Conservation Area was one of the Natural Preserves listed in the 1999 MPPCL, intended to be left in its natural unimproved state. The Lujuna parcel was listed as a Conservation Reserve. The purpose of the MPPCL is to reserve public lands for specific government purposes, with the remainder made available to the Chamorro Land Trust Commission. To date the status of these lands is unresolved. Until the Guam Park System inventory is amended to incorporate the MPPCL, the Natural Preserves and Conservation Reserves remain under the jurisdiction of the Chamorro Land Trust Commission.

According to an earlier document, the *Guam Public Land-Use Plan*,⁵⁷ the Anao property was designated as Conservation Reserve by law. The Plan also noted the presence of historic/prehistoric sites and limestone forest and referred to the site as a Seashore Reserve.

Public land between Janum Point and Campanaya Point, except for the Lujuna parcel, is not listed as either Natural Preserve or Conservation Reserve in the MPPCL. The 1984 *Guam Public Land-Use Plan* identified the Lujuna property as being “agriculture (sparse)” and designated it as Conservation land. The following constraints were noted: historic/prehistoric sites, limestone forest, and Seashore Reserve. South of Lujuna, the Plan identified agricultural (sparse) land suitable for development, although limestone forest was noted as a site constraint. Further south, land was identified as “historical site excavation” and designated as Conservation (historic site, open space). Constraints included the presence of historic/prehistoric sites, limestone forest, and identification as a Seashore Reserve.

The Falcona Beach parcel, located north of Communications Annex Finegayan, was described in the 1984 Plan as “steep slopes to cliffs” and designated as Conservation, with limestone forest noted as a site constraint.

Given the unresolved status of these lands, plans during the next 10 years are unknown. The record of section 7 consultations does not show any GovGuam actions relating to projects in these or other conservation areas. Assuming that the land would remain undeveloped, the only actions anticipated would be those associated with conservation, research, or education.

⁵⁷ Bureau of Planning September 1984. *Guam Public Land-Use Plan*.

Affected Area

The combined affected area between Anao Point at the AAFB boundary and Campanaya Point is approximately 1,319 ac (534 ha).

The entire Falcona Beach parcel, 97 ac (39 ha), is within proposed critical habitat.

Federal Involvement

Federal involvement is possible if conservation, research, or education projects are conducted with Federal funds. However, as stated above, there is no record of previous section 7 consultations for such projects.

Presence of Federally Listed Species

The cliffline in northern Guam is known to be *occupied* by the endangered Mariana fruit bat. The Seashore Reserve areas may provide habitat to the endangered hawksbill and threatened green sea turtles.

Costs of Section 7 Consultations and Project Modifications

Until the status of these lands is resolved, the likelihood of projects being conducted for conservation, research, or education is low. This resolution is unlikely to occur within the 10-year timeframe of the analysis. Hence, no section 7 consultations are expected.

6.2.1.3.3 Southern Guam Public Land

Public land in southern Guam included within proposed critical habitat include two parcels located in the Bolanos Conservation Area in the vicinity of Mount Bolanos and small portions of three lots to the east and west of the proposed critical habitat. The total area of public land in southern Guam is approximately 1,355 ac (548 ha). Lots 507 and 509, a total of approximately 1,263 ac (511 ha), were designated as Conservation in the 1984 *Guam Public Land-Use Plan*, and comprise approximately 71 percent of the 1,787 ac (723 ha) Bolanos Conservation Area. The lots were described in the 1984 Plan as watersheds; lot 507 was described as existing conservation reserve.

As with the public land in northern Guam, no actions that would involve section 7 consultation are anticipated during the next decade.

Affected Area

The combined affected area is approximately 1,355 ac (548 ha).

Federal Involvement

Federal involvement is possible if conservation, research, or education projects are conducted with Federal funds. However, as stated above, there is no record of previous section 7 consultations for such projects.

Presence of Federally Listed Species

These parcels are assumed to be *occupied* by the Mariana fruit bat, Mariana common moorhen, and Mariana swiftlet.

Costs of Section 7 Consultations and Project Modifications

Until the status of these lands can be resolved, the likelihood of projects being conducted for conservation, research, or education is low. Hence, no section 7 consultations are expected.

6.2.1.4 Guam Private Land

Proposed critical habitat encompasses approximately 1,888 ac (764 ha) of private lands. This represents approximately 7.6 percent of the total area being proposed for critical habitat on Guam and 1.4 percent of the total island of Guam.

Information about private lands and potential development was obtained from private landowners who responded to a request for interviews. As discussed in Chapter 5, attempts were made to request interviews with landowners. Input was obtained from members of families that own the following areas:

- Land-locked lots outside of, and to the northwest of, Unit A (Artero Family);
- Land-locked lots outside of, and to the northeast of, Unit A (Castro Family); and
- Lots in the southern part of Unit B (Bordallo Family).

The type of development being considered for the land-locked lots outside of Unit A are similar—beach-oriented recreation for tourists. For the lots in the southern part of Unit B, tourism-oriented development being considered is more along the lines of eco-tourism and adventure racing. These are discussed below.

6.2.1.4.1 Potential Activity/Project—Beach-Oriented Recreation for Tourists Northwest of Unit A

The 424-ac (172-ha), privately-owned property is in the northwest part of Guam known as Urunao. The property is located outside of proposed critical habitat, with the exception of boundary areas abutting AAFB. Access by land requires travel along a GovGuam-managed road through the base.

The privately-owned land is zoned Hotel and presently includes ranch homes, ranch animals, and other agriculture uses. Commercial use, currently limited to intermittent day tours,⁵⁸ has been constrained by lack of access and infrastructure, and presence of dump sites at AAFB (planned for clean-up by the Air Force by December 2003). Other significant limiting factors include the economic downturn in the Asian economies that directly affected the Guam tourism industry and the KAL crash on August 6, 1997, which led to the termination of KAL flights to Guam until December 28, 2001 (prior to the crash, approximately 80 tourists per day were brought in to enjoy the area). Conditions that are expected to make the prospects of on-site development more attractive than in the past include the current installation of infrastructure, *e.g.*, water, power, and telephone.

⁵⁸ Mr. Tony M. Artero. Meeting with Ms. Lesley Matsumoto *et al.* of Belt Collins on August 6, 2002.

Affected Area

The privately-owned property is located outside of proposed critical habitat, with the exception of 40 ac (16 ha) of boundary areas abutting AAFB. Access to the property requires travel through Air Force and U.S. Fish and Wildlife Service land that is proposed as critical habitat, though existing roads would not be considered critical habitat.

Federal Involvement

Current access along GovGuam-managed roads is open to the public and access through Guam National Wildlife Refuge lands is open to landowners in Urunao. Opening the road segment through Refuge lands for public access would require section 7 consultation within the Service.

Presence of Federally Listed Species

Federally listed species known to *occupy* the Air Force and Refuge area surrounding the route of property access include the endangered Mariana crow and endangered Mariana fruit bat.

Costs of Section 7 Consultations and Project Modifications

Two consultations are assumed: (1) one intra-Service (for the segment of road that affects the Guam National Wildlife Refuge), and (2) one between the Air Force and the Service (for the larger segment of road that affects AAFB). Costs would include the Service's and Air Force's time to conduct formal consultations.

Federally listed species *occupy* the area, so consultations would be required even if critical habitat is not designated. However, with critical habitat designation, the Service anticipates providing recommendations to minimize modifications to critical habitat. For the 10-year project period, substantial road improvements or realignments are not anticipated; therefore, no biological survey is assumed. However, additional costs and project modifications due to critical habitat are anticipated in the form of annual biological monitoring near the existing roadway (100-ac open area, low cost estimate shown in Table 6-2). Medium range cost estimates are assumed for consultations.

- Total section 7 cost: $1.10 \times (\$5,100 \text{ [Service]} + \$5,100 \text{ [Service]} + \$6,400 \text{ [Air Force]} + \$5,100 \text{ [Service]}) = 1.10 \times (\$21,700) = \$23,870$
 - A Cost attributable to critical habitat: 10 percent of \$21,700 or \$2,170
- Anticipated total project modifications and costs: $\$10,000 \text{ [monitoring]} = \$10,000$
 - A Cost attributable to critical habitat: 10 percent of \$10,000 or \$1,000

Over a 10-year period, the costs would include:

- 10-year section 7 costs: $1.10 \times (\$5,100 \text{ [Service]} + \$5,100 \text{ [Service]} + \$6,400 \text{ [Air Force]} + \$5,100 \text{ [Service]}) = 1.10 \times (\$21,700) = \$23,870$
 - Cost attributable to critical habitat: 10 percent of \$21,700 or \$2,170
- 10-year project modification cost: $1.10 \times (10 \text{ years} \times \$10,000 \text{ per year [monitoring]}) = 1.10 \times (\$100,000) = \$110,000$
 - A Cost attributable to critical habitat: 10 percent of \$100,000 or \$10,000

6.2.1.4.2 Potential Activity/Project—Beach-Oriented Recreation for Tourists Northeast of Unit A

The 36-ac (15-ha) Castro-owned Jinapsan land is zoned Agriculture. Prior to September 11, 2001, commercial uses included eco-tours and beach-oriented day tours. These activities were conducted through the family corporation, Tataniku Corporation, which leases property to Ultimate Beach Inc., dba Star Sand; Jinapsan Tours; and Ababang Tours. Current access to the area is constrained not only for tourists and guests, but for family members as well.

Commercial development in this land-locked area northeast of Unit A has been limited by AAFB's more stringent security, which makes it impossible to ensure access and translates into high risks for prospective investors and developers. Other significant limiting factors include the economic downturn in the Asian economies that directly affected the Guam tourism industry, as well as the 1997 KAL crash.

Affected Area

Approximately 12 ac (5 ha) or 33 percent of the land-locked parcels northeast of Unit A are within proposed critical habitat.

Federal Involvement

Land-based access on existing roads requires Air Force approval. Should future development result in changes in traffic volume or roadway improvements, such changes would require Air Force approvals and section 7 consultation with the Service.

The planning and construction of a new road would require approvals from the Air Force and Service. Section 7 consultations would be required.

Presence of Federally Listed Species

The only Federally listed species known to *occupy* Jinapsan is the endangered Mariana fruit bat. Federally listed species known to *occupy* Air Force land required for property access include the endangered Mariana crow and endangered Mariana fruit bat.

Costs of Section 7 Consultations and Project Modifications

Based on input from the Air Force⁵⁹, recent plans to evaluate access road alternatives through Northwest Field of AAFB and the Guam National Wildlife Refuge have been suspended because of security concerns. However, section 7 related costs are estimated in this report should preparations to construct a road to Jinapsan resume.

Two consultations are assumed: (1) one intra-Service (for the segment of road that affects the Guam National Wildlife Refuge), and (2) one between the Air Force and the Service. Costs would include the Service's and Air Force's time to conduct formal consultations. Using the estimates in Table 6-1, a medium level of effort is assumed.

Federally listed species *occupy* the area, so consultations, including a biological survey, would be required even if critical habitat is not designated. With the designation of critical habitat, the Service expects to provide recommendations to minimize modifications to critical habitat. The cost of one

⁵⁹ Ms. Joan Poland, U.S. Air Force. Telephone conversation with Ms. Betty Gayle of Belt Collins on September 25, 2002.

biological survey in a 500-ac forested area (see Table 6-2) is used because it is assumed that the survey would address two alternative road alignments. After the consideration of design and environmental factors and selection of an alignment, project modifications are anticipated, including changes to construction plans to realign a 2,000-ft (610-m) segment of the road and annual biological monitoring (100-ac open area cost in Table 6-2). The medium range cost estimates for consultations and the biological survey provided in Tables 6-1 and 6-2, respectively, are assumed for this action. For annual biological monitoring, the low cost for a 100-ac open area is used because access would be easy from the new road.

- Total section 7 cost: $1.10 \times (\$5,100 \text{ [Service]} + \$5,100 \text{ [Service]} + \$6,400 \text{ [Air Force]} + \$5,100 \text{ [Service]} + \$26,400 \text{ [biological survey]}) = 1.10 \times (\$48,100) = \$52,910$
 - A Cost attributable to critical habitat: 10 percent of (\$48,100) or \$4,810
- Anticipated total project modifications and costs: $1.10 \times (\$43,000 \text{ [topographic survey and construction plan modifications]}^{60} + \$9,800 \text{ [monitoring]}) = 1.10 \times (\$52,800) = \$58,080$
 - A Cost attributable to critical habitat: 10 percent of \$52,800 or \$5,280

Over a 10-year period, the costs would include:

- 10-year section 7 costs: $1.10 \times (\$5,100 \text{ [Service]} + \$5,100 \text{ [Service]} + \$6,400 \text{ [Air Force]} + \$5,100 \text{ [Service]} + \$26,400 \text{ [biological survey]}) = 1.10 \times (\$48,100) = \$52,910$
 - A Cost attributable to critical habitat: 10 percent of (\$48,100) or \$4,810
- 10-year project modification cost:
 $1.10 \times (\$43,000 \text{ [topographic survey and construction plan modifications]}) + 10 \text{ years} \times 1.10 \times (\$9,800 \text{ [monitoring]}) = 1.10 \times (\$43,000) + 1.10 \times (\$98,000) = \$155,100$
 - A Cost attributable to critical habitat: 10 percent of (\$43,000 + \$98,000) = \$14,100

6.2.1.4.3 Potential Activity/Project—Eco-Tourism and Adventure Racing in the Southern Part of Unit B

The 453-ac (183-ha) area owned by the Bordallo family is zoned Agriculture, a catch-all category for land not designated as Residential, Commercial, or Industrial. Current use of the land includes adventure racing and hiking.

Affected Area

The entire 453-ac (183-ha) property is located within critical habitat.

Federal Involvement

In order to provide safe access into the property, future development or commercial use is expected to require bridge improvements on the existing road that crosses five rivers. Such improvements would require permits and approvals from the ACOE.

⁶⁰ Design costs assumed to be performed by Guam firm and include \$18,000 for a topographical survey and \$25,000 for preparation of 35 percent construction plans for 2,000 linear ft of roadway.

Presence of Federally Listed Species

Federally listed species known to *occupy* the area include the endangered Mariana fruit bat and the endangered Mariana swiftlet.

Costs of Section 7 Consultations and Project Modifications

Proposed activities on this privately-owned parcel would not require a section 7 consultation unless a Federal permit or approval is needed (see Chapter 3). For bridge improvements, a section 7 consultation would be required with or without proposed critical habitat. In this case, the cost for consultation would include time for the Service and the ACOE to consult, the time for the private owner (via a consultant), and a biological survey in the vicinity of the bridges (a 10-ac [4-ha] area is assumed for this analysis). Project modifications associated with bridge improvements are estimated to be the cost of a 10 percent design (\$23,200),⁶¹ which would be borne by the private landowner. Project modifications specific to proposed critical habitat are likely to address clearing of new areas, accidental fires, and spread of invasive weeds; hence, modifications may include limiting the extent of vegetation clearing along roads and near bridges, and implementing measures to prevent fire.⁶² Because these measures could be integrated with maintenance costs, these costs are not estimated for purposes of this analysis. No project modifications are expected due to adventure racing or hiking activities as their effects would be minimal or non-existent, and any impacts on habitat from these type of activities would be minimal and temporary. It is assumed that long-term biological monitoring would not be needed. Medium cost estimates provided in Tables 6-1 and 6-2 are used.

- Total section 7 cost: $1.10 \times (\$4,200 \text{ [private landowner]} + \$6,400 \text{ [ACOE]} + \$5,100 \text{ [Service]} + \$7,800 \text{ [biological survey]}) = 1.10 \times (\$23,500) = \$25,850$
 - A Cost attributable to critical habitat: 10 percent of \$23,500 or \$2,350
- Anticipated total project modifications and costs: \$23,200 for bridge design
 - A Cost attributable to critical habitat: 10 percent of \$23,200 or \$2,320

Over a 10-year period, the costs would include:

- 10-year section 7 cost: $1.10 \times (\$4,200 \text{ [private landowner]} + \$6,400 \text{ [ACOE]} + \$5,100 \text{ [Service]} + \$7,800 \text{ [biological survey]}) = 1.10 \times (\$23,500) = \$25,850$
 - A Cost attributable to critical habitat: 10 percent of \$23,500 or \$2,350
- 10-year project modification cost: \$23,200
 - A Cost attributable to critical habitat: 10 percent of \$23,200 or \$2,320

⁶¹ Assumptions based on bridge construction costs on Kauai, Hawaii#: Construction for a bridge of 42' x 70' is \$1,500,000; design cost is \$232,000 with 10 percent designs at \$23,200.

⁶² Biologist, Pacific Islands Fish and Wildlife Office, U.S. Fish and Wildlife Service. October 17, 2002.

6.2.2 Rota

Anticipated direct costs resulting from designating critical habitat on Rota are provided in this section. Specific projects potentially affected by proposed critical habitat were identified through interviews with CNMI government representatives, including the Mayor of Rota and his staff. Project-specific costs are estimated for CNMI public lands and for private lands.

The proposed areal extent of critical habitat for the Mariana crow, Unit C, is illustrated in Figure 6-2. This represents 6,084 ac (2,462 ha) or 29 percent of the total area of Rota, including undevelopable cliffs and existing CNMI conservation areas.

6.2.2.1 CNMI Public Lands

Of the proposed critical habitat, approximately 5,581 ac (2,259 ha) are public lands. This represents approximately 92 percent of the total area being proposed for critical habitat and 27 percent of the total area of Rota.

Based on interviews with CNMI and Rota government representatives, the following development projects were identified:

- improvements at the Rota International Airport,
- roadway improvements to Route 100,
- development of the Marianas Agupa Golf Course,
- development of a solid waste disposal landfill, and
- implementation of the homesteads program.

These plans are described and economic effects evaluated with respect to critical habitat.

6.2.2.1.1 Potential Activity/Project—Airport Improvements

Rota International Airport, operated by the Commonwealth Ports Authority, consists of 1,132 ac (458 ha) that include the airfield, terminal facilities, and a substantial amount of open meadow and native forest. The single 6,000-ft (1,829-m)-long runway is 150 ft (46 m) wide and is connected to the apron terminal by two exit taxiways.⁶³ This runway can accommodate Boeing 727 jets but generally serves small commuter aircraft.⁶⁴ The airport expansion is essential for expanding Rota's tourism market and further economic development.

The *Draft Rota International Airport Master Plan Update*⁶⁵ provides a 20-year capital improvement program for short-range, mid-range, and long-range projects. Short-range and mid-range projects planned within the next 10 years have been considered in this analysis. Such projects include patching and sealing of the terminal parking lot and access road, construction of a 2,600-ft (792.5-m)

⁶³ Winzler & Kelly *et al.* July 7, 2002. *Draft Rota International Airport Master Plan Update*. Prepared for Commonwealth Ports Authority Rota, Commonwealth of Northern Mariana Islands.

⁶⁴ Bank of Hawaii Web site. *Commonwealth of the Northern Mariana Islands, Economic Report, August 2001*, <http://www.boh.com/econ/pdfs/CNMI.pdf>; accessed September 4, 2002.

⁶⁵ Winzler & Kelly *et al.* July 7, 2002. *Draft Rota International Airport Master Plan Update*. Prepared for Commonwealth Ports Authority Rota, Commonwealth of Northern Mariana Islands.

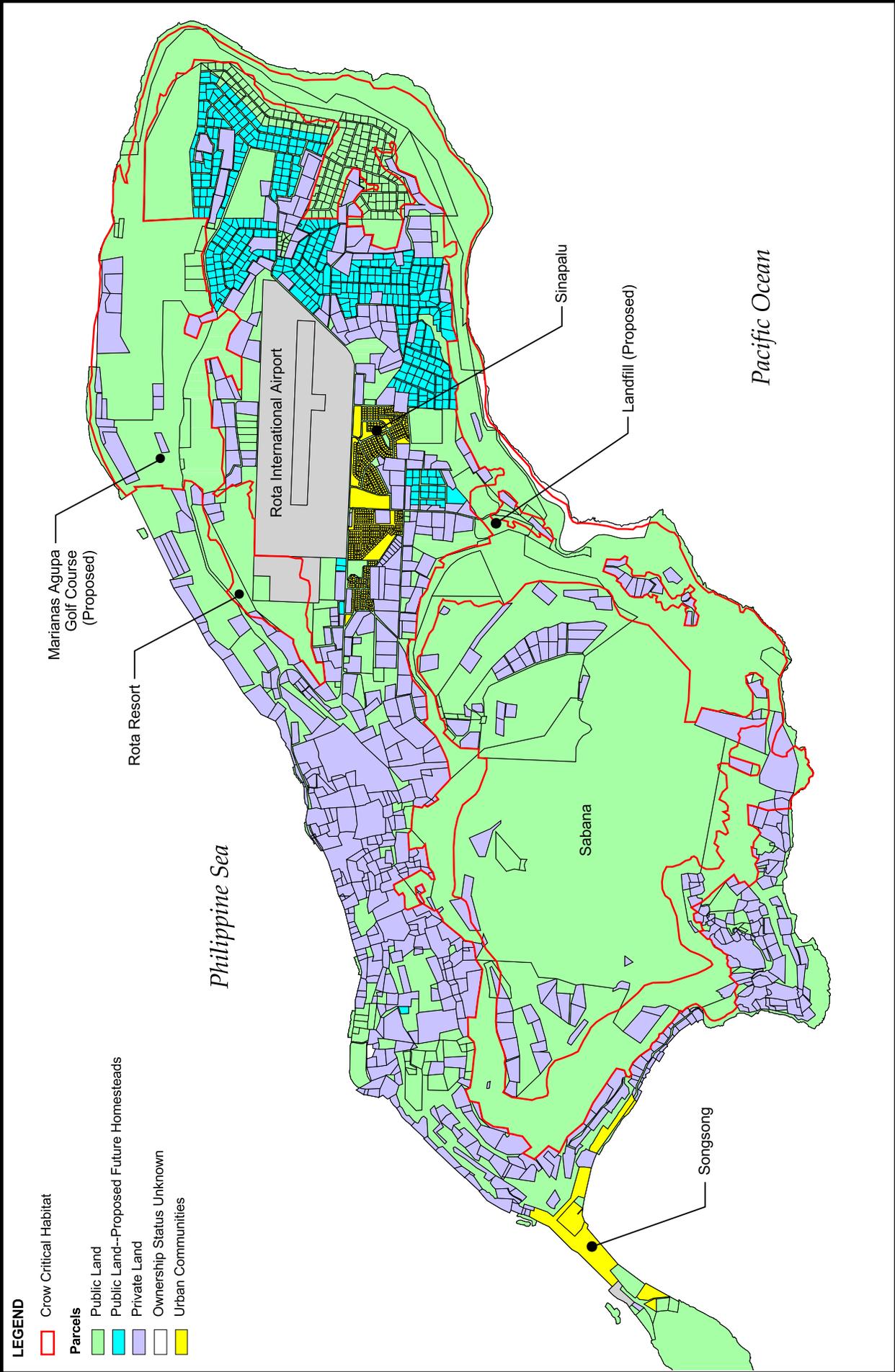


Figure 6-2
ROTA LAND PARCELS AND CRITICAL HABITAT--Unit C

Draft Economic Analysis of Proposed Critical Habitat Designations for Threatened and Endangered Species on Guam and Rota

runway extension and turnouts, acquisition of two aircraft rescue and firefighting vehicles, enlargement of detention basin and related culvert upgrades, and light seal-coating of runway and turnouts. Of these projects, the runway extension is the most likely to affect adjacent areas proposed as critical habitat.

Affected Area

Rota International Airport, including the proposed runway extension to a total of 8,600 ft (2,621.3 m), is physically outside of the area proposed for critical habitat. With the extension, Federal Aviation Administration (FAA)-required design elements, such as runway safety areas, object free areas, and runway protection zones that serve to protect public safety or protect airspace needed for take-offs and landings, would likewise be extended. FAA safety areas/zones appear to fall within airport property on the west side of the runway but extend beyond airport property on the east side. In all cases, they do not appear to overlap proposed critical habitat. However, because jet engine emissions and noise and the flight paths of birds are not limited by the two-dimensional property boundaries of the airport, proposed airport expansion could affect neighboring critical habitat. These issues are likely to be addressed during consultation.

Federal Involvement

The proposed runway extension will require FAA approvals and, possibly, funding. With or without critical habitat, a section 7 consultation would be required because of the presence of the Mariana crow.

Presence of Federally Listed Species

Rota International Airport and the expansion site are *occupied* by the endangered Mariana crow. Besides the endangered Mariana fruit bat, which is proposed for listing as threatened under the Act, no other listed species have been identified on the airport property.

Costs of Section 7 Consultations and Project Modifications

A Federally listed species *occupies* the area, so consultations would be required even if critical habitat is not designated. A biological survey would be needed because of neighboring areas believed to be primary and secondary breeding habitat for the Mariana crow.⁶⁶ With or without the designation of critical habitat, project modifications are expected in the form of biological monitoring on an annual basis. The medium range cost estimates for consultations and surveys (10-ac area) provided in Tables 6-1 and 6-2 are assumed for this action. Ten percent of these costs are estimated to be attributable to critical habitat.

- Total section 7 cost: $1.10 \times (\$5,100 \text{ [Service]} + \$6,400 \text{ [FAA]} + \$4,200 \text{ [CNMI]} + \$7,800 \text{ [biological survey]}) = 1.10 \times (\$23,500) = \$25,850$
 - A Cost attributable to critical habitat: 10 percent of \$23,500 or \$2,350
- Anticipated total project modifications and costs: $1.10 \times (\$7,800 \text{ [monitoring]}) = \$8,580$
 - A Cost attributable to critical habitat: 10 percent of \$7,800 or \$780

⁶⁶ Winzler & Kelly *et al.* July 7, 2002. *Draft Rota International Airport Master Plan Update*. Prepared for Commonwealth Ports Authority Rota, Commonwealth of Northern Mariana Islands.

Over a 10-year period, the costs would include:

- 10-year section 7 costs: $1.10 \times (\$5,100 \text{ [Service]} + \$6,400 \text{ [FAA]} + \$4,200 \text{ [CNMI]} + \$7,800 \text{ [biological survey]}) = 1.10 \times (\$23,500) = \$25,850$
 - A Cost attributable to critical habitat: 10 percent of \$23,500 or \$2,350
- 10-year project modification cost: $1.10 \times (10 \text{ years} \times \$7,800 \text{ [monitoring]}) = \$85,800$
 - A Cost attributable to critical habitat: 10 percent of \$78,000 or \$7,800

6.2.2.1.2 Potential Activity/Project—Route 100 Improvements

The physical condition of the existing roadway system on Rota is not adequate to handle increases in traffic associated with the level of tourism that Rota desires. Of the 87 mi (140 km) of roads and village streets, only 12 mi (19.3 km) are paved. Many are coral-surfaced unpaved roads.

The Route 100 project consists of widening and paving existing unpaved roads between Sinapalu and Songsong Villages. These improvements and connection to the existing paved road between the Airport and Songsong Village would create a scenic loop road, promoting easy access to places of special interest to visiting tourists.

Affected Area

It is assumed that the Route 100 improvements would occur over the existing improved southern roadway proposed as a scenic collector. This alignment is approximately 10 mi (16.1 km) in length, of which 2.9 mi (4.7 km) is estimated to fall within proposed critical habitat. Assuming that the existing roadway width is about 12 ft (3.7 m) and the proposed roadway would be 30 ft (9.1 m) wide, the estimated area within proposed critical habitat is 6 ac (2 ha).⁶⁷

Federal Involvement

Funding from the Federal Highways Administration (FHWA) would be used for road improvements, so the FHWA has initiated a section 7 consultation with the Service. Should the proposed critical habitat rule be promulgated prior to completion of the project, the section 7 consultation would be reinitiated.

Presence of Federally Listed Species

The endangered Mariana crow is present within the proposed Route 100 corridor. In addition, *Serianthes nelsonii*, a tree listed as endangered, is present. Species proposed to be listed include: *Tabernaemontana rotensis*, a proposed endangered tree; *Nesogenes rotensis*, a proposed endangered plant; and the Mariana fruit bat, a proposed threatened species.

⁶⁷ 18 ft [width not previously disturbed] x 2.9 mi or 15,312 ft [length of roadway within critical habitat] = 275,616 square ft or 6 ac (2 ha).

Costs of Section 7 Consultations and Project Modifications

A Federally listed species *occupies* the area and a section 7 consultation with the Service has been initiated by the FHWA. A biological survey of the road is being conducted as part of CNMI Division of Fish and Wildlife consultation with the Service.⁶⁸

In this case, reinitiation of consultation would occur and these costs are estimated to be 50 percent of typical consultation costs.⁶⁹ A biological survey is not expected to be needed as a result of designation of proposed critical habitat, and project modifications are unlikely.⁷⁰ Medium range cost estimates for consultations in Table 6-1 are assumed.

- Total section 7 cost: $0.50 \times (\$5,100 \text{ [Service]} + \$6,400 \text{ [FHWA]} + \$4,200 \text{ [CNMI]})$
 $= 0.50 \times (\$15,700) = \$7,850$
 - A Cost attributable to critical habitat: 100 percent or \$7,850
- Anticipated total project modifications and costs: none
 - A Cost attributable to critical habitat: none

Over a 10-year period, the costs would include:

- 10-year section 7 costs: $0.50 \times (\$5,100 \text{ [Service]} + \$6,400 \text{ [FHWA]} + \$4,200 \text{ [CNMI]}) = 0.50 \times (\$15,700) = \$7,850$
 - A Cost attributable to critical habitat: 100 percent or \$7,850
- 10-year project modification cost: none
 - A Cost attributable to critical habitat: none

6.2.2.1.3 Potential Activity/Project—Marianas Agupa Golf Course

Approximately 360 ac (146 ha) have been designated by CNMI for the Marianas Agupa Golf Course. In 1990, a land lease agreement between the Marianas Public Land Corporation and the Marianas Agupa Inc. was approved. The original project plan included as many as seven different hotels and three golf courses. To date, no development has occurred.

Affected Area

The total area of 360 ac (146 ha) is encompassed by proposed critical habitat. The land is considered prime Mariana crow habitat.

Federal Involvement

The proposed private development on public lands is not expected to involve a *Federal nexus*; hence, a section 7 consultation would not be required.

⁶⁸ Biologist, Pacific Islands Fish and Wildlife Office, U.S. Fish and Wildlife. October 17, 2002.

⁶⁹ 50 percent of typical consultation costs assumed to account for time to review files of completed consultation and to coordinate current consultation.

⁷⁰ Biologist, Pacific Islands Fish and Wildlife Office, U.S. Fish and Wildlife. October 17, 2002.

Presence of Federally Listed Species

In addition to the endangered Mariana crow, other Federally listed species present on the proposed Marianas Agupa Golf Course site are the threatened green sea turtle (*Chelonia mydas*) and the endangered hawksbill turtle (*Eretmochelys imbricata*). Species proposed for listing are the *Tabernaemontana rotensis* (endangered) and Mariana fruit bat (threatened).

Costs of Section 7 Consultations and Project Modifications

A *Federal nexus* has not been identified; therefore, a section 7 consultation is not required and no costs for section 7 would occur.

6.2.2.1.4 Potential Activity/Project—Solid Waste Landfill

In 1996, it was estimated that Rota produced less than 7.67 tons (6.96 metric tons) of solid waste per day.⁷¹ To meet projected increases in solid waste disposal demands, a new landfill is being planned.

Affected Area

A solid waste landfill facility is proposed on 39 ac (16 ha) in the south-central part of the island.⁷² Approximately 20 ac (7.9 ha) fall within proposed critical habitat. The site is assumed to be undisturbed.

Federal Involvement

The proposed landfill would have to meet U.S. Environmental Protection Agency (EPA) requirements for a permitted, lined municipal solid waste landfill. For this reason, a section 7 consultation is required.

Presence of Federally Listed Species

The endangered Mariana crow is present on the landfill site. No other Federally listed species are present. The Mariana fruit bat, proposed to be listed as a threatened species, is present.

Costs of Section 7 Consultations and Project Modifications

A Federally listed species *occupies* the area; hence, a section 7 consultation with the Service would be initiated by the EPA even if critical habitat is not designated. Because the proposed solid waste facility is almost fully encompassed within proposed critical habitat and *occupied* by the Mariana crow, a biological survey is likely to be required. Should the facility be approved, provisions described in the EPA *Solid Waste Disposal Facility Criteria Technical Manual* (e.g., the addition of daily cover to the working face of the landfill) to prevent or control on-site populations of disease vectors, including birds, are expected to be addressed in the solid waste facility permitting process. No additional biological surveys or long-term monitoring as a result of the section 7 process are anticipated. Medium range cost estimates for consultations and surveys (Tables 6-1 and 6-2) have been used, and the cost for a 100-ac forested area has been assumed.

⁷¹ Tenorio, J.C. & Associates, Inc. January 1996. *Commonwealth of Rota, Rota Physical and Economic Master Plan*.

⁷² Meeting with CNMI representatives on August 8, 2002.

- Total section 7 cost: $1.10 \times (\$5,100 \text{ [Service]} + \$6,400 \text{ [EPA]} + \$4,200 \text{ [CNMI]} + \$11,500 \text{ [biological survey]}) = 1.10 \times (\$27,200) = \$29,920$

A Cost attributable to critical habitat: $0.10 \times (\$27,200) = \$2,720$

- Anticipated total project modifications and costs:

None; the control⁷³ of bird nesting and feeding activities at the landfill, using techniques appropriate for protection of human health and the environment to prevent the spread of disease, is expected to be addressed within the scope of the solid waste permit approval process and not specifically for section 7 consultation findings.

A Cost attributable to critical habitat: none

Over a 10-year period, the costs would include:

- 10-year section 7 costs: $1.10 \times (\$5,100 \text{ [Service]} + \$6,400 \text{ [EPA]} + \$4,200 \text{ [CNMI]} + \$11,500 \text{ [biological survey]}) = 1.10 \times (\$27,200) = \$29,920$

A Cost attributable to critical habitat: $0.10 \times (\$27,200) = \$2,720$

- 10-year project modification cost: none

A Cost attributable to critical habitat: none

6.2.2.1.5 Potential Activity/Project—Homesteads Program

The DLNR, Division of Public Lands, manages the homesteads program, which provides land for a nominal fee to qualified persons of Northern Marianas descent seeking to finance and construct their own home or agricultural tract. Each person is eligible for a maximum of one agricultural and one village homestead, each consisting of 2.5 ac (1.0 ha). Upon meeting certain conditions of the program, and after a period of three years elapses from the grant of a homestead, the property can be transferred in fee to the participant. The recipient may mortgage the property after receiving freehold interest, provided that all funds received from the mortgagee be devoted to improvement of the land.⁷⁴

Affected Area

Large tracts in the eastern part of the island are public lands proposed for agricultural or village homesteads. Most of these areas are outside of proposed critical habitat; however, approximately 247 ac (100 ha) are within proposed critical habitat.

Federal Involvement

No Federal authorization, funding, or implementation is involved with the homesteads program; therefore, section 7 consultation does not apply.

Presence of Federally Listed Species

⁷³ Control techniques primarily consist of daily application of a minimum of six inches of earthen or alternative cover materials to the landfill surface. Supplementary vector control alternatives that could be considered include reducing the size of the working face of the landfill, increasing cover thickness, changing cover type or density, or composting or processing organic wastes prior to disposal.

⁷⁴ CNMI Constitution, Article XI: Public Lands, section 5.

The endangered Mariana crow is present in the area proposed for future homesteads.

Costs of Section 7 Consultations and Project Modifications

A *Federal nexus* has not been identified; therefore, a section 7 consultation is not required and no costs for section 7 would be incurred.

6.2.2.2 Private Lands

A brief summary of land ownership is presented herein to provide context and an understanding as to why private land ownership is not common.

The Covenant to Establish a Commonwealth of the Northern Mariana Islands in Political Union with the United States of America, 48 U.S.C. §1901 note, reflects the importance of the land in the culture and traditions of the people of the Northern Mariana Islands. Article VIII, Property, section 806 of the Covenant states:

. . . the Government of the Northern Mariana Islands, in view of the importance of the ownership of land for the culture and traditions of the people of the Northern Mariana Islands, and in order to protect them against exploitation and to promote their economic advancement and self-sufficiency: (a) . . . regulate the alienation of permanent and long-term interests in real property so as to restrict the acquisition of such interest to persons of Northern Mariana Islands descent; and (b) may regulate the extent to which a person may own or hold land which is now public land.

Article VIII, Property, section 801 of the Covenant requires:

All right, title and interest of the Government of the Trust Territory of the Pacific Islands in and to real property in the Northern Mariana Islands on the date of the signing of this Covenant or thereafter acquired in any manner whatsoever will, no later than upon the termination of the Trusteeship Agreement, be transferred to the Government of the Northern Mariana Islands. All right, title and interest of the Government of the Trust Territory of the Pacific Islands in and to all personal property on the date of the signing of this Covenant or thereafter acquired in any manner whatsoever will, no later than upon the termination of the Trusteeship Agreement, be distributed equitably in a manner to be determined by the Government of the Trust Territory of the Pacific Islands in consultation with those concerned, including the Government of the Northern Mariana Islands.

As a result of Covenant provisions, private property is scarce and consists of properties that have been deeded or are in the process of being deeded from the Marianas Public Land Corporation to a homestead recipient, as discussed in Chapter 6.2.2.1.5 of this report.

6.2.2.2.1 Potential Activity/Project—Activities on Privately Held Agricultural Homesteads

Privately owned agricultural homesteads can be used for residential and agricultural activities. Activities on these lands could include construction of homes, clearing of vegetation, and various agricultural activities.

Affected Area

Approximately 418 ac (169 ha) within proposed critical habitat are held in fee by CNMI individuals. Another 97 ac (39 ha) are being permitted for agricultural homesteads, but are not yet deeded.

Federal Involvement

No Federal authorization, funding, or implementation is involved or is expected to be involved with the homesteads program; therefore, section 7 consultation does not apply.

Presence of Federally Listed Species

The endangered Mariana crow is present in the area proposed for future homesteads.

Costs of Section 7 Consultations and Project Modifications

A *Federal nexus* has not been identified; therefore, a section 7 consultation is not required and no costs associated with the section 7 process would be incurred.

6.3 INDIRECT COSTS

Section 7 consultation applies only to activities that have *Federal involvement*. The designation of critical habitat does not afford additional protection for listed species on non-Federal land or with respect to strictly non-Federal activities, *e.g.*, private sector or GovGuam activities with no *Federal involvement*.

The designation of critical habitat may have indirect costs beyond those associated with the Endangered Species Act. It may provide an opportunity for local jurisdictions to require additional protections for designated critical habitat that would not otherwise be subject to such protections. These protections may affect both the management of subject lands as well as local government development approvals. In addition, there is the potential for impacts on property values. These and other indirect costs are addressed below.

6.3.1 Guam

Possible indirect impacts, issues and concerns associated with proposed critical habitat designations on Guam are presented in this section.

6.3.1.1 Potential Impacts on the Navy's Natural Resources Management Program

COMNAVMARIANAS's natural resources management program is based primarily on the INRMP for Navy lands on Guam approved in November 2001, and the Guam National Wildlife Refuge cooperative agreement with the Service signed in December 1993. Changes in the Navy's natural resources management program to comply with critical habitat requirements could limit the effectiveness of the Navy's existing program for protecting threatened and endangered species on Navy land.

The ecosystem management strategy outlined in the INRMP establishes priorities and budgets to carry out activities that benefit listed species on Navy land. According to COMNAVMARIANAS staff, natural resources program funding for existing activities would likely change if critical habitat is designated. Presently, the Navy focuses its funding on listed species *occupying* Navy lands,

including the swiftlet and moorhen. The highest populations of these birds on Guam are found on Navy property. Because the amount of money available for such projects is not expected to increase, a portion of the budget currently directed to benefitting existing threatened and endangered species would be redirected to protecting *unoccupied* habitat. This indirect cost, which cannot be measured at this time, would be calculated in terms of dollars not spent on managing and protecting moorhen and swiftlet and their habitat.

With the designation of proposed critical habitat, there is a high probability that the Navy would withdraw its overlay lands from the Guam National Wildlife Refuge. Ongoing projects conducted by the Service biologist, including feral ungulate control, would be reduced in scope to accommodate critical habitat activities within the existing budget. However, the goals stipulated within the existing cooperative agreement⁷⁵ between the Navy and the Service for the establishment and management of the Guam National Wildlife Refuge suggest that critical habitat activities should already be addressed. COMNAVMARIANAS staff believes that the refuge overlay partnership meets the Navy's mission, costs less, results in less regulation and delay, and provides a funding mechanism for hiring biologists and applying for endangered species recovery funds. With critical habitat, the partnership between the Navy and the Service would change into a regulatory relationship. At this time, the indirect cost of this change can only be described qualitatively.

6.3.1.2 Potential Impacts on Military Training

Navy land on Guam is used for training by resident Navy, Air Force, National Guard, and Reserve units. Continental U.S.-based, forward-based (Alaska, Hawaii, Japan, Korea), and forward-deployed forces of the Army, Air Force, Navy, and Marine Corps also train on Guam. Navy Carrier Battle Groups, Amphibious Ready Groups, and Marine Expeditionary Units deployed from their west coast bases often transit the Marianas and use training areas on Guam and Tinian. The Marianas are also the site of regularly scheduled joint or combined exercises such as Tandem Thrust.

The military's national defense mission cannot be changed, so future land use and activities on Navy property are not expected to change. However, some of the methods by which the mission is accomplished may require modification to avoid or minimize impacts on critical habitat. The most serious indirect impact of critical habitat designation would be changes in training activities that result in less realistic scenarios and, hence, training that is less effective in preparing military personnel for combat. For example, in Hawaii[#], troops are sometimes required to switch to an "administrative" mode in the vicinity of sensitive habitat, which means effectively stopping all training while transiting the area. For the Navy's proposed field carrier landing practices at AAFB, the Service recommended that the highest minimum elevations be used for aircraft activity. While this may have been amenable to the Navy, this is an example of a training restriction. If other locations (including foreign locations) are available, military units may choose to conduct their training elsewhere rather than modify their activities.

Impacts of critical habitat constraints on realistic training would be minimal if reasonable alternative sites are available. Having to modify one or two exercises may not have a measurable effect, but

⁷⁵ Cooperative Agreement between the U.S. Navy and the U.S. Fish and Wildlife Service for the Establishment and Management of the Guam National Wildlife Refuge, Guam. March 4, 1994.

cumulative impacts must be considered. Guam's suitability as a training area is enhanced by the opportunities it provides for a wide range of training activities. Units are able to accomplish multiple training objectives in one location. For example, Ordnance Annex offers maneuver areas for company-level operations, helicopter landing zones, and a reservoir for helicopter fire bucket and combat swimmer training. Communications Annex Finegayan is suitable for ground maneuvers, patrols, and raids and also has a small arms range. If too many of these activities are constrained, the military may find it difficult to maximize training opportunities on Guam.

The cost of less realistic and effective training cannot be easily quantified. Military experience in Kosovo, Chechnya, and elsewhere has demonstrated that about 70 percent of combat casualties are due to lack of or insufficient training. Given this situation, it is possible that relocating training to another site to retain realism may be preferred to modifying the activity, in spite of the higher cost.

6.3.1.3 Potential Impacts on Air Force Activities

AAFB staff has not identified any issues that suggest the possibility of indirect costs due to critical habitat designation. Unlike the Navy, the likelihood of the Air Force withdrawing its land from the Guam National Wildlife Refuge is unknown. Changes in the Air Force's natural resources management program are less likely because two of the subject species *occupy* AAFB, and the program is already focused on the Mariana crow and Mariana fruit bat.

Potential indirect impacts on military training could occur, considering current activities. Ongoing training at Main Base consists primarily of airfield operations. Northwest Field is used for a wide range of activities including fixed-wing and helicopter training, confined area landings, night vision goggle training, special operations by helicopter and reconnaissance/SEAL teams, small unit maneuvers and bivouacs, urban-environment training in abandoned structures, over-the-beach training, and use of small arms ranges. The only new training proposed and approved in the Marianas Training EIS/Handbook is establishment of a permanent site to conduct rapid runway repair training at Northwest Field.

6.3.1.4 Increased Negative Sentiments Toward Federal Government Due to Additional Federal Control of Land on Guam

The history of foreign occupation and U.S. military administration of Guam, the island's status as a U.S. territory, and cultural ties of the indigenous Chamorro to their land must be acknowledged to understand Chamorro sentiments regarding the potential for additional Federal control of land on Guam.

In 1521, first contact with the Chamorro by Europeans was made by Ferdinand Magellan, followed by Spanish claim to the island in 1565, and colonization by Spanish missionaries in 1668. After over 330 years of rule, Spain ceded Guam to the United States with the 1898 Treaty of Paris. On December 23, 1898, President William McKinley issued an Executive Order placing Guam under direct administration of the Department of the Navy. When World War II began in the Pacific in 1941, the Japanese seized and occupied Guam until it was recaptured by U.S. forces in July 1944.

The Navy resumed administration of the island, and between 1945 and 1950, approximately one-third of the land on Guam was acquired by the Department of Defense through land condemnation.⁷⁶

With passage of the Guam Organic Act in 1950, the Secretary of the Interior gained administrative responsibility for the island. The Act conferred U.S. citizenship on the people of Guam and established local self-government. It provided a republican form of government with locally elected executive and legislative branches, an appointed judicial branch, and one elected, non-voting delegate to the U.S. House of Representatives.

Currently, Guam is an unincorporated,⁷⁷ organized⁷⁸ Territory of the United States. Many Guam residents believe they are second-class citizens, lacking the full rights guaranteed under the U.S. Constitution to citizens of the 50 states who have full representation in Congress and the right to vote in Presidential elections. Since the late 1980s, the Guam Commission on Self-Determination has proposed the Guam Commonwealth Act in an effort to improve the island's political status. This Act would grant Guam greater authority over its internal affairs and ensure the right of self-determination for the Chamorro people.

Along with self-determination, land rights are extremely important to the Chamorro people. Land is said to be central to the Chamorro culture; Chamorros refer to themselves as the "taotao tano" or the people of the land.⁷⁹ Governor Carl T.C. Guitierrez characterized the sentimental ties to the land in his address to the Guam Committee on Resources by saying, "Our land is intrinsically tied to our soul, the core of our being. Our determination to regain our land is not a political battle with the Fish and Wildlife Service, it is a spiritual quest to preserve the essence of our identity as Chamorros."⁸⁰

Cultural ties to the land combined with the history of Federal control over Guam land have created a community climate that is emotionally averse to further Federal land restrictions. A current land restriction of concern involves the private landowners to the northeast and northwest of AAFB that are land-locked by the base. Unrestricted access to private property has never been granted because of Air Force security requirements, which have only become more restrictive since September 11, 2001. One landowner believes that the failure of the Federal government to grant unfettered access to the land-locked Jinapsan properties will worsen an already economically depressed environment and hamper emancipation of the owners and their rights to reasonable use and development of their properties.⁸¹

In addition, there is concern that the proposed designation will hinder or delay the return of surplus Federal property to GovGuam.

⁷⁶ Guam's Congressional Delegate, Robert A. Underwood Web site. About Guam, <http://www.house.gov/underwood/guam.htm>; accessed September 30, 2002.

⁷⁷ Unincorporated meaning that not all provision of the U.S. Constitution apply to the Territory. (Source: U.S. Department of the Interior. Office of Insular Affairs Web site, <http://www.doi.gov/ia/facts.html>; accessed September 30, 2002.)

⁷⁸ Organized because the Congress provided the Organic Act of 1950 that organized the government much as a constitution would. (Source: U.S. Department of the Interior. Office of Insular Affairs Web site, <http://www.doi.gov/oia/facts.html>; accessed September 30, 2002.)

⁷⁹ Guam's Congressional Delegate, Robert A. Underwood Web site. About Guam, <http://www.house.gov/underwood/guam.htm>; accessed September 30, 2002.

⁸⁰ The Honorable Carl T.C. Gutierrez. October 29, 1997. Statement on Commonwealth before Congress; accessed September 30, 2002.

⁸¹ Mr. Fred M. Castro. August 7, 2002. "Issue Paper Economic Impact Analysis Proposed Designation of Ritidian as Critical Habitat. Submitted by Castro Family Landowners of Jinapsan Lot 997 And Land Claimants of Largest Ritidian Partial"

The factors described above contribute to the negative sentiments of the Chamorro toward the Federal government. Land related issues, such as regulations providing additional constraints or controls, are very contentious. Furthermore, constraints on private land are not understood and not welcomed, especially when they do not seem logical. For example, private landowners find it difficult to understand why critical habitat is being proposed on their land when they believe that the brown treesnake is the cause of the subject species being endangered, and they are not aware of a resolution to this problem. Increased negative sentiment toward the Federal government because of this additional regulation could manifest itself in refusals to comply with the ESA and further degradation of U.S.-Guam relations. One landowner provided the following statement:

*The proposed action will have a damaging effect on federal-territorial relations and in the long run may prompt a move for less federal intrusion and ouster of USFWS from Guam, limited or restricted in land areas and far different and removed from nationally and continentally driven practices and conventions of wildlife conservation and protection.*⁸²

Worst-case associated costs could be equivalent to the net benefit anticipated with designation of proposed critical habitat, plus the costs incurred to address concerns raised by frustrated private landowners during public comment periods for future Federal projects. These costs could include those associated with drawn out negotiations and delays in Federal project schedules. While it is unlikely that Federal projects would be stopped by GovGuam delays, the cost of negotiations and delays to the Federal government could amount to hundreds of thousands of dollars per project.

Should private lands be affected by the proposed designation of critical habitat, the effects due to increase in negative sentiment may be minimized with improved communications, *e.g.*, in the form of face-to-face discussions, to explain the proposed rule and the possible effects on landowners. Landowners are looking to the Service to demonstrate a willingness to work with them, to understand land, family, cultural, and social issues, and to express good faith, cooperation, and empathy.

6.3.1.5 Potential Impacts on Development Approvals

Private landowners, developers, and other interested parties in states such as Hawai# have suggested that designation of critical habitat could significantly affect local development approvals, even when there is no Federal involvement.

On Guam, the concern includes the possibility of the GEPA requiring more complex (and hence more costly) environmental impact assessments for Guam Land Use and Seashore Protection Commission applications. If so, the permit process may be more lengthy and may result in more costly project modifications. In addition, the risk of projects being denied may be higher. The primary focus of concern would be with projects located in areas not previously recognized as environmentally sensitive because they contain no listed species, *i.e.*, *unoccupied* critical habitat.

However, the private lands in Guam proposed as critical habitat are considered *occupied* by listed species, so the designation should not substantially increase the amount of effort required to navigate the development approval process. As one of the key reviewing agencies, DAWR may propose

⁸² *Ibid.*

project modifications or safe harbor agreements, but they would be proposed even if critical habitat is not designated.

6.3.2 Rota

As demonstrated in Section 6.2.2, the direct costs resulting from proposed critical habitat are not expected to be significant. The greatest costs could be those associated with the lesser understood implications of the indirect impacts. Issues and concerns are described below.

6.3.2.1 Additional Coastal Resources Management Office Requirements

A potential indirect effect of proposed critical habitat would be an increase in permit requirements by the CNMI CRM Office. As discussed in Section 4.3.1, a permit from CRM is required whenever a proposed project is planned within an Area of Particular Concern (APC) or is considered a major siting. Because the CRM Office may amend the implementing regulations to recognize critical habitat as an APC, the number of permit applications submitted to CRM may increase. Since 1990, 92 Minor Permits and 19 Major Sitings Permits have been issued.⁸³

Major Sitings Permits are substantially more costly and require more time to process than Minor Permits. The fee for a Minor Permit is \$100, while the fee for a Major Sitings Permit is based on the construction cost, *e.g.*, \$1,500 for construction costs of \$500,000 to \$1,000,000. The cost to prepare an application for a Major Sitings Permit is substantially greater than that of a Minor Permit because the substantial amount of CNMI government time is taken to process the application and the cost to the proponent to prepare an environmental impact assessment. Costs for an environmental impact assessment vary depending upon the environmental complexities of the proposed project, but could range from \$50,000 to \$150,000. Experienced planning would also be needed so that the increased permit process time of 60 days for the Major Sitings Permit, compared to 10 days for a Minor Permit, does not result in costly delays.

The difference in cost between a Minor Permit and a Major Sitings Permit, and the likelihood that CRM may amend their regulations to include critical habitat as an APC, raised the concern that designation of critical habitat may elevate a Minor Permit action to a Major Sitings Permit action. Upon closer examination, however, it seems unlikely that the designation of critical habitat would elevate Minor Permit actions to Major Sitings Permit actions because the act of proposing a project in an APC needs to be considered with its potential to directly and significantly impact coastal resources, *i.e.*, a project proposed in an APC does not require a Major Sitings Permit in and of itself. An increase in the number of Minor Permit actions could occur, but a substantial increase is unlikely because proposed critical habitat is primarily in areas that are set aside for conservation purposes or are generally considered undevelopable.

⁸³ CRM Permit Manager, CNMI Coastal Resources Management Office, October 31, 2002.

6.3.2.2 Negative Public Reaction to Critical Habitat for the Mariana Crow

The Mariana crow is perceived by many on Rota as an agricultural pest. Based on meetings with the Mayor of Rota and his staff, the public response to rule-making that designates critical habitat for the crow may have adverse consequences on survival of the species. The lead permitting authority for CNMI, the CRM Office, indicated that kills of the Mariana crow have been occurring, although numbers were not known, and that Federal enforcement assistance is needed to prevent this from occurring in the future.⁸⁴

As explained by the Mayor of Rota, the people of Rota have strong sentimental and cultural attachments to their land, which is formally recognized in the Covenant.⁸⁵ Considering CNMI's history of foreign occupancy, *e.g.*, Spanish, German, Japanese, and U.S., and the efforts of those who negotiated conditions in the Covenant allowing land previously held by the Government of the Trust Territory of the Pacific Islands to be transferred to the CNMI Government, any proposition by the Federal government to control land would be extremely difficult to realize and poorly understood. The Mayor of Rota believes that such land controls, which contradict certain provisions in the Covenant, would alienate the people of Rota from their land. Restrictions on land development would not only frustrate Rota's residents, but also make it more difficult for CNMI to demonstrate self-reliance.

To minimize negative public sentiment and potential adverse consequences on the crow resulting from negative public sentiment, the Mayor and his staff provided suggestions. These suggestions were made to avoid Federal land restrictions made "in perpetuity" and to offset perceived future socioeconomic losses with specific opportunities providing socioeconomic gain. To avoid applying the proposed rule in perpetuity, while striving to meeting the Service's objectives for the crow, the Mayor suggested establishing a program of land acquisition or lease of critical habitat lands for a defined period of time that would allow the crow to multiply, *e.g.*, 10 years with an option for another 10 years. Specific opportunities to provide socioeconomic gain included suggestions that the Service provide their concurrence to allow CNMI to release 240 homestead lots, and that the Federal government provide employment opportunities, economic assistance, and other assistance identified through negotiations.

Indirect costs associated with the Mayor of Rota's suggestions have not been estimated, as it is not known whether the Federal government would consider such suggestions requiring additional Federal funding, and the extent to which these suggestions could be carried out is also unknown. It is clear, however, that should the scenario of impacts on the Mariana crow due to critical habitat rule-making be realized, the effects and costs would be great, essentially causing the intentions of critical habitat to back-fire.

⁸⁴ Mr. William Pendergrass, Coastal Resources Management Office. Meeting on August 10, 2002.

⁸⁵ Article VIII, section 803 of the Covenant recognizes that as...*in view of the importance of the ownership of land for the culture and traditions of the people of the Northern Mariana Islands, and in order to protect them against exploitation and to promote their economic advancement and self-sufficiency...*

6.3.2.3 Conflicting Goals of the Mariana Public Land Trust with Proposed Critical Habitat

Article XI, section 4 of the Constitution of the Northern Mariana Islands, establishing the Marianas Public Land Corporation, states that its directors shall be held to strict standards of fiduciary care and provide an annual written report describing the management of public lands and the nature and effect of transfers of interests in public land made during the preceding year. The Corporation receives all monies from public lands except those from lands in which freehold interest has been transferred to another agency of government. It then transfers these monies, minus Corporation expenses, to the Marianas Public Land Trust (MPLT), established pursuant to Article XI, section 6 of the Constitution. Trustees for the MPLT are required to make reasonable, careful, and prudent investments. Because of this fiduciary responsibility, the MPLT strives to manage lands in a manner that will encourage development and revenue-generating activities.

Proposed critical habitat is perceived as a land development constraint that conflicts with the MPLT's responsibilities. While proposed designation of critical habitat is not expected to affect the Federal section 7 process because the Mariana crow is present throughout proposed homestead areas, the additional permitting requirements imposed by CNMI CRM for any development in proposed critical habitat, an anticipated APC, would increase development costs and could discourage prospective developers.

The direct cost due to proposed critical habitat and the CRM's requirement is estimated in section 6.2.2 of this report. The indirect estimated revenue lost due to CRM's anticipated permit requirement in response to critical habitat would depend on the plans of future prospective developers, as well as market conditions and the state of the regional and Asian economies, which may not fully recover in the next 10 years. No information on prospective development is available at this time.

6.3.2.4 Practice of Subsistence Agriculture

The Mayor of Rota and his staff identified the potential for critical habitat designation to restrict the practice of subsistence agriculture. Concern was raised that the proposed designation may limit opportunities for people on Rota to grow crops on agricultural homesteads to feed themselves and earn revenue. This concern is addressed herein.

The 2000 Census suggests that subsistence agriculture is a very small part of the Rota economy. Of the total employed civilian labor force, 7.8 percent were identified as engaged in subsistence activity. Of the population not in the labor force, 2.6 percent were engaged in subsistence activity. There is no breakdown in the types of subsistence activities, but it can be assumed that they include farming, fishing, and gathering.

An examination of the proposed critical habitat boundaries indicates that most of the land is in Conservation, and the areas set aside as agricultural homesteads, where subsistence activities are most likely, have been largely excluded from the proposed designation. Hence, less than 2.6 percent of the population engaged in subsistence activities on Rota would possibly be on lands proposed as critical habitat. For this reason and because a *Federal nexus* is not present on these properties, indirect impacts on subsistence activities from designating critical habitat are highly unlikely.

6.4 POTENTIAL IMPACTS ON SMALL ENTITIES

6.4.1 Regulatory Flexibility Act

Under the Regulatory Flexibility Act (RFA) (as amended by the Small Business Regulatory Enforcement Fairness Act [SBREFA] of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (*i.e.*, small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.

SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities.

This analysis determines whether the designation of proposed critical habitat potentially affects a “substantial number” of small entities in counties supporting critical habitat areas. It also quantifies the probable number of small businesses likely to experience a “significant effect.” While SBREFA does not explicitly define either “substantial number” or “significant effect,”⁸⁶ the EPA and other Federal agencies have interpreted these terms to represent an impact on 20 percent or more of the small entities in any industry and an effect equal to or greater than three percent or more of a business’ annual revenues.⁸⁷ In both tests, this analysis conservatively examines the total estimated section 7 costs calculated in earlier sections of this report, including those impacts that may be “attributable co-extensively” with the listing of the species.

6.4.2 Impact on Small Entities

Potential entities that may be affected by the designation of proposed critical habitat are identified below. Based on the responses to our inquiries, activities of these entities have been identified.

Guam:

- Navy (regional military training activities and facilities)
- Air Force (improvements to infrastructure and facilities, training activities)
- GovGuam (develop park/recreation/historic/conservation use)

Rota:

- Government of CNMI (airport and roadway improvements, resort and golf course development, homesteads program)

⁸⁶ Regulatory Flexibility Act, 5 U.S.C. 601 et. seq.

⁸⁷ See U.S. Environmental Protection Agency. March 29, 1999. *Revised Interim Guidance for EPA Rulewriters: Regulatory Flexibility Act as amended by the Small Business Regulatory Enforcement Fairness Act.*

- Marianas Agupa Inc. (resort and golf course)
- CNMI residents (homesteads)

In addition, to the above, two small entities were involved in section 7 consultations on Guam: the Urunao Resort Corporation for road access across Navy lands, and a Chamorro family for gathering on Guam National Wildlife Refuge lands (see Section 6.1.1).

Some of the above entities do not fit the description of “small entities” as developed by the Small Business Administration (SBA):

- Federal government agencies (*e.g.*, Navy, Air Force) are not small businesses under SBA guidelines.
- The RFA/SBREFEA defines “small governmental jurisdiction” as the government of a city, county, town, school district, or special district with a population of less than 50,000. However, territorial and commonwealth governments are considered independent sovereigns, not small governments. As such, GovGuam and the Government of CNMI would not be considered “small entities.”

Given these adjustments, the primary projects and activities that might be affected by the proposed designation that could affect small entities involve the following:

- Urunao Resort Corporation (Guam)
- A Chamorro family (Guam)
- Marianas Agupa Inc. (Rota)
- CNMI residents (Rota)

Regarding the two small entities on Guam, the outcome of each consultation was that project modifications due to critical habitat rules would be minor and not result in an economic burden (Section 6.1.1). Regarding the three small entities on Rota, the analysis provided determined that no costs would be incurred due to section 7 consultations because there is no *Federal nexus* (Section 6.2.2).

Based on the above analysis, a significant economic impact on a substantial number of small entities will not result from the proposed critical habitat designation.

6.5 POTENTIAL ECONOMIC BENEFITS OF SECTION 7 IMPLEMENTATION

The published economics literature has documented that real social welfare benefits can result from the conservation and recovery of endangered and threatened species.⁸⁸ Such benefits have also been ascribed to preservation of open space and biodiversity (see examples in Pearce and Moran, 1994 and Fausold and Lillieholm, 1999), both of which are associated with species conservation. Likewise, regional economies can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend.

The primary goal of the Act is to enhance the potential for species recovery. Thus, the benefits of actions taken under the Act are primarily measured in terms of the value the public places on species preservation (*e.g.*, avoidance of extinction, and/or an increase in a species' population). Such social welfare values may reflect both use and non-use (*i.e.*, existence) values. For example, use values might include non-consumptive recreational use of a species (*i.e.*, viewing opportunities), or the potential for consumptive uses should recovery be achieved. Non-use values are not derived from direct use of the species, but instead reflect the utility the public derives from knowledge that a species continues to exist.

In addition, as a result of actions taken to preserve endangered and threatened species, various other benefits may accrue to the public. Such benefits may be a direct result of modifications to projects made following section 7 consultation, or may be collateral to such actions. For example, a section 7 consultation may result in the requirement for buffer strips along streams, in order to reduce sedimentation due to construction activities. A reduction in sediment load may directly benefit water quality, while the presence of buffer strips may provide the collateral benefits of preserving habitat for terrestrial species and enhancing nearby residential property values (*e.g.*, preservation of open space).

This section describes the benefits resulting from implementation of section 7 of the Act, in the context of areas affected by the proposed designation. It then discusses the extent to which existing valuation studies can be used to monetize these benefits. Finally, it discusses whether these benefits can be defined on a unit-by-unit basis, and whether these benefits attributable to critical habitat designation can be distinguished from all section 7 related benefits.

⁸⁸ R.C. Bishop. 1978. "Endangered species and uncertainty: the economics of a safe minimum standard." *American Journal of Agricultural Economics*.

R.C. Bishop. 1980. "Endangered Species: An Economics Perspective," *Transactions of the 45th North American Wildlife and Natural Resources Conference*.

D.L. Brookshire, L.S. Eubanks, and A. Randall. 1983. "Estimating option prices and existence values for wildlife resources." *Land Economics*.

K.J. Boyle, and R.C. Bishop 1986. "The economic valuation of endangered species in wildlife." *Transactions of the Fifty-First North American Wildlife and Natural Resources Conference*.

R.K. Hageman. 1985. "Valuing marine mammal populations: benefit valuation in a multi-species ecosystem.," Administrative report No. LJ-85-22.

K. Samples, J. Dixon, and M. Gowen. 1986. "Information disclosure and endangered species valuation." *Land Economics*.

J.R. Stoll and L.A. Johnson. 1984. "Concepts of value, nonmarket valuation, and the case of the whooping crane." Texas Agricultural Experiment Station Article No. 19360.

As discussed below, it is not feasible to fully describe and accurately quantify the benefits of this proposed designation in the context of this economic analysis. The discussion presented in this report provides examples of potential benefits, which derive primarily from the listing of the species, based on information obtained in the course of developing the economic analysis. It is not intended to provide a complete analysis of the benefits that could result from section 7 of the Act in general or critical habitat designation in particular. *Given these limitations, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*

6.5.1 Benefits Overview and Estimation Methodology

Implementation of section 7 of the Act may, with uncertain probability, increase the likelihood of recovery for the Mariana fruit bat and Guam Micronesian kingfisher on Guam and the Mariana crow on Guam and Rota. For the Guam Micronesian kingfisher and Mariana crow, the probability of recovery depends on successful reintroduction of the species into the wild on Guam. For all three species on Guam, successful recovery depends on adequate control of the nonindigenous brown treesnake.

Implementation of section 7 of the Act includes both the jeopardy provisions afforded by the listing, as well as the adverse modification provisions provided by the proposed designation. Specifically, the section 7 consultations that address the fruit bat, kingfisher and crow will assure that actions taken by Federal agencies do not jeopardize the continued existence of the three species or adversely modify their habitat. Note that these measures are separate and distinct from the section 9 *take* provisions of the Act, which also provide protection to these species.

The benefits of critical habitat designation can be placed into two broad categories:

- Those associated with the primary goal of species recovery; and
- Those that derive mainly from the habitat protection required to achieve this primary goal.

To determine the extent to which the proposed critical habitat designation for the listed species may provide these benefits, the analysis 1) first identifies the physical/biological changes to the ecosystem provided by section 7 implementation, then 2) determines the types of species-specific and ecosystem-wide benefits associated with those changes. The discussion below provides qualitative descriptions of the economic benefits associated with these environmental improvements. While it is possible to estimate the number of projects that will generate consultations requiring project modifications, existing data do not allow for quantification or monetization of the ecological implications of these requirements.

6.5.2 Benefits Provided by Section 7 Implementation for the Listed Species

6.5.2.1 Ecosystem Changes Associated with Section 7 Implementation

In the case of the Mariana fruit bat, Guam Micronesian kingfisher and Mariana crow, habitat protection provides for a variety of ecosystem changes/improvements. Table 6-5 summarizes both the likely improvements in the ecosystem associated with section 7 implementation and the modifications in activities and projects that promote them. Specifically, columns one and two of Table 6-5 indicate the potential improvement in the ecosystem associated with implementation of section 7 for the listed species, as well as the specific project modifications and activities that enable those changes. As the table indicates, ecosystem protections/improvements range from minimizing disturbance associated with noise to off-site mitigation banking.

6.5.2.2 Direct Benefits—Species-Specific Benefits Associated with Ecosystem Changes

Species-specific benefits derived from proposed critical habitat will only be realized with the control of the introduced brown treesnake (*Boiga irregularis*). Within the last 50 years, the brown treesnake has become an exceptionally common pest that causes ecological and economic problems on Guam and threatens other Pacific islands. It has wiped out the native forest birds of Guam and causes frequent power outages when climbing on electrical lines and equipment. Federal laws and programs have been established to identify effective control strategies for the brown treesnake. Barriers and traps are being studied to evaluate their effectiveness on controlling the brown treesnake in Area 50, AAFB, and island-wide trapping has been occurring; however, more research is needed to reduce and control brown treesnake populations to levels that would allow the restoration of native species to their natural habitat. Without effective reduction and control of the brown treesnake, the crow, kingfisher, and fruit bat will not be able to exist and no species-specific benefit would occur from proposed critical habitat.

Use Value

The value that the public holds for conservation of the Mariana fruit bat, Guam Micronesian kingfisher, and Mariana crow may include a direct use component related to wildlife viewing opportunities. Similarly, individuals may value species preservation to the extent that it increases the probability of future non-consumptive use (*i.e.*, option value). Furthermore, large-scale birdwatching leads to regional economic benefits.⁸⁹

However, data do not exist to allow for estimation of the number of additional bird viewing trips, or improved trips, that will result from actions taken to protect the fruit bat, crow or kingfisher under section 7. Thus, it is not possible to monetize this category of benefit.

⁸⁹ Michelle M. Manion, Rebecca A. West, and Robert E. Unsworth. April 2000. "Economic Assessment of the Atlantic Coast Horseshoe Crab Fishery." Prepared for the Division of Economics, U.S. Fish and Wildlife Service.

Table 6-5: Physical/Biological Improvement¹ Expected to Result From the Implementation of Section 7 of the Act

Physical/Biological Improvement	Expected Project Modification	Activity	Critical Habitat Unit	Breakdown of Consultations	Allocation
Decreased habitat loss	Change location or minimize vegetative/noise disturbance, Monitor fruit bats, Modification of road or pipeline routes	Military training, Military facility construction, Road construction	Unit A	Air Force Navy GovGuam	Jeopardy and Adverse modification
			Unit B	Navy GovGuam	
			Unit C	CNMI	
Substitute habitat (mitigation)	On- and Off-site Mitigation	Military facility expansion, Road construction	Unit A	Air Force Navy GovGuam	Jeopardy and Adverse modification
			Unit B	Navy GovGuam	
			Unit C	CNMI	
Preservation of Open Space	On- and Off-site Mitigation	Military facility expansion, Road construction	Unit A	Air Force Navy GovGuam	Jeopardy and Adverse modification
			Unit B	Navy GovGuam	
			Unit C	CNMI	

¹ Species-Specific Benefits Associated with Ecosystem Changes

Existence Value

A number of published studies have demonstrated that the public holds values for endangered and threatened species separate and distinct from any expected direct use of these species (*i.e.*, a willingness to pay to simply assure that a species will continue to exist). These studies include Boyle and Bishop (1987), Elkstrand and Loomis (1998), Kotchen and Reiling (2000), and Loomis and White (1996).

While the public's willingness to pay for preservation and enhancement of a wide range of species has been studied, no studies have addressed the non-use values associated with endangered crows, kingfishers or fruit bats specifically. Nonetheless, there is substantial evidence of existence value for 1) various other threatened and endangered bird species, 2) small and mid-sized mammal species, and 3) certain lesser known or seen species such as small nonrecreational fish.⁹⁰ Taken together, these studies suggest ample evidence that existence value can be attributed to the survival and recovery of the listed species.

However, it is not clear to what extent the ecosystem changes associated with section 7 implementation will enhance the likelihood of the listed species' existence. As a result, it is not possible at this time to estimate the value of this benefit.

6.5.2.3 Indirect Benefits—Ecosystem-Wide Benefits Associated with Section 7 Implementation

Recreation Benefits

Protecting critical habitat for the Mariana fruit bat, Mariana crow and Guam Micronesian kingfisher may result in preservation of habitat suitable for other recreational uses, such as hiking, camping, and birdwatching. Conservation of critical habitats for these species may lead to increased tourism, especially ecotourism on Rota and other nature-based tourism opportunities on Guam. However, because data on the resultant increase in number or quality of trips are unavailable, quantitative estimates of such recreational benefits cannot be measured.

Overall Ecosystem Health

Mariana fruit bats and Mariana crows are integral parts of the ecosystem in which they live. For example, fruit bats play important ecological roles as pollinators and seed distributors (Fujita and Tuttle 1991). Prior to their extinction from the wild, Guam Micronesian kingfishers were an integral part of the ecosystem on Guam. Protecting the primary constituent elements for these three species will benefit other organisms that cohabit these areas. Each one of these organisms may in turn provide some level of direct or indirect benefit to the public and local economies. Together with supporting remediation measures to control the brown treesnake, endangered species conservation

⁹⁰ R.P. Berrens, P. Ganderton, and C. Silvia. 1996. "Valuing the protection of minimum instream flows in New Mexico." *Journal of Agricultural and Resource Economics*.

R.P. Berrens, A.K. Bohara, C.L. Silve, D. Brookshire, and M. McKee. 2000. "Contingent Values for New Mexico instream flows: With tests of scope, group-size reminder and temporal reliability," *Journal of Environmental Management*.

measures contribute to the maintenance of native biodiversity (Daily and Ehrlich, 1995) and collectively act to protect the island ecosystems of Guam and Rota.

While these benefits can be described qualitatively, existing data are not available to quantify the scale of these changes, such as required for monetization.

Ecosystem Preservation Values

Protecting critical habitat for the Mariana fruit bat, Guam Micronesian kingfisher, and Mariana crow may result in preservation of the limestone forest ecosystems characteristic to Guam and Rota. The public of the region may receive economic value from knowing that the island ecosystem will be available in the future (Loomis, 2000). Other studies, including Walsh (1984), Richer (1995), and Hagen *et al.* (1992) confirm the public's willingness to pay for ecosystem protection; however these data may not represent the sentiments of the public on Guam and Rota.

Moreover, it is not clear to what extent the ecosystem changes associated with section 7 implementation will enhance the likelihood of the listed species' existence. As a result, it is not possible at this time to estimate the value of this benefit.

Other Benefits

Additional benefits of designating critical habitat for the three species may include educational/informational benefits (increased awareness by the public of the extent of habitat), increased support and Federal funding for existing conservation efforts, and reduced uncertainty regarding the extent of fruit bat, kingfisher, and crow habitat. Project modifications for park and refuge activities have included the creation of educational programs for the public. Critical habitat designation will also provide a firm legal definition of the extent of habitat, which may reduce regulatory uncertainty. Local planners may have better information to formulate their land use policies as a result of critical habitat designation. At this time sufficient information does not exist to quantify or monetize these benefits.

6.5.3 Monetary Value of the Benefits of Section 7 Implementation for the Listed Species

As discussed above, sufficient information does not exist to allow for quantification of the secondary benefits of habitat protection (*e.g.*, recreational benefits, overall ecosystem health, etc.). Thus, this section focuses on the benefits of implementing section 7 of the Act, and specifically the benefits associated with the proposed designation of critical habitat, expressed in terms of the public's willingness to pay to enhance the probability of recovery of the endangered Mariana fruit bat, Guam Micronesian kingfisher, and Mariana crow. This discussion focuses on the existing economics literature, as gathered in the course of this analysis.

6.5.3.1 Benefits Transfer Overview

Developing a reasonable estimate of the economic benefits associated with species conservation requires a rigorous analytic approach that describes and then quantifies the value society places on the conservation and recovery of an endangered species. Since species conservation values are not generally observed in market transactions, economists rely on estimates of the public's willingness

to pay developed using stated preference tools (*e.g.*, contingent valuation surveys). However, the resources required to develop, pre-test, and administer a survey that assesses the benefits associated with the proposed Mariana fruit bat, Guam Micronesian kingfisher, and Mariana crow designation is beyond the scope of this study.

When primary research is not possible, economists frequently rely on the method of benefits transfer. Benefits transfer involves application of results of existing valuation studies to a new policy question.⁹¹ For example, the economics literature provides a large number of studies that define the economic surplus associated with protecting threatened and endangered bird species or their habitat. The economics literature provides only a few studies defining the surplus value associated with protecting small to mid-sized threatened or endangered mammals.⁹² Benefits transfer involves the transfer of these existing estimates of nonmarket values for the protection of threatened or endangered species (the “policy case”) to the case of critical habitat designation for the Mariana fruit bat, Guam Micronesian kingfisher, or Mariana crow (the “study cases”). Two core principals of defensible benefits transfer are (1) the use of studies that apply acceptable techniques to generate welfare values, and (2) similarity between the good being valued in the literature and the good being valued in the policy context to which the transfer is being made (*i.e.*, the protection afforded the listed species by critical habitat).

6.5.3.2 Application of Benefits Transfer to the Mariana Fruit Bat, Guam Micronesian Kingfisher, and Mariana Crow

This section provides a literature summary identifying relevant and comparable studies that present a range of economic values associated with the protection of threatened, endangered, or sensitive bird or small to mid-sized mammal species or their habitats. Based on this review, no studies are identified that provide values applicable to assessing the monetary benefits provided by section 7 protections for the species.

Table 6-6 summarizes several studies reported in the literature that attempt to estimate the non-use value the public holds for preservation of various threatened bird and small to mid-sized mammal species, the conservation of their habitat, and associated recreational activities (*i.e.*, bird watching). Non-use values represent the public’s willingness-to-pay to preserve a species or enhance a species’ population above and beyond any expected direct use. Although each study addresses, to some extent, the valuation of threatened or endangered bird or small to mid-sized mammal species, none of these studies is particularly applicable to the cases under consideration.

⁹¹ For more discussion of benefits transfer, see Environmental Protection Agency, *Guidelines for Preparing Economic Analyses* (EPA 240-R-00-003), September 2000.

⁹² J.B. Loomis and D.S. White. 1996. “Economic Benefits of Rare and Endangered Species: Summary and Meta-analysis.” *Ecological Economics*.

Piran C.L. White, Alison C. Bennett, and Emma J.V. Hayes. 2001. “The use of willingness-to-pay approaches in mammal conservation,” *Mammal Review*.

Kristin M. Jakobsson and Andrew K. Dragun. 2001. “The worth of a possum: Valuing species with the contingent valuation method,” *Environmental and Resource Economics*.

Table 6-6: Summary of Economic Valuation Literature Related to Bird and Small to Mid-sized Mammal Species

Author	Species and Geographic Area	Key Issues Addressed in Survey	Survey Administration	Range of Values
WILLINGNESS TO PAY STUDIES FOR THREATENED OR ENDANGERED BIRD SPECIES				
<p>Reaves <i>et al.</i> (1999) [see also Reaves <i>et al.</i> (1994)]</p>	<p><i>Species:</i> Red-cockaded woodpecker (Federally listed as endangered in 1970) <i>Geographic Area:</i> Francis Marion National Forest, South Carolina</p>	<p>Willingness to pay for restoration activities increasing the probability of red-cockaded woodpecker population survival from 50 to 99 percent contingent on habitat protection. Willingness to pay for protection of red-cockaded woodpecker habitat surveyed but not reported. Surveys were conducted after Hurricane Hugo severely damaged an important National Park habitat and killed approximately two-thirds of that population in 1989. Valuation question formats differed across respondents. Results from three formats, including double-bounded dichotomous choice, open ended, and payment card bid amounts, compared.</p>	<p><i>Sample Frame:</i> Half South Carolina residents and half U.S. residents <i>Sample Size:</i> 225 Open-ended responses 223 Dichotomous choice responses 234 Payment card responses <i>Response Rate:</i> 51.4 percent overall 45.4 percent with usable bids <i>Survey Mode:</i> Mail survey <i>Payment Vehicle:</i> Annual payment into trust fund</p>	<p>\$7.57 - \$13.25 Estimated mean individual willingness to pay per year for restoration activities increasing the probability of population survival from 50 to 99 percent.</p>
<p>Bowker and Stoll (1988); Stoll and Johnson (1984)</p>	<p><i>Species:</i> Whooping crane (Federally listed as endangered in 1967) <i>Geographic Area:</i> Birds migrate from Canada to Texas annually and have been observed in CO, ID, KS, MT, ND, NM, OK, TX, UT, WY, and elsewhere</p>	<p>Total resource value associated with the whooping crane, including both non-consumptive use and non-use value. Respondents were provided a hypothetical scenario where public funding to monitor and maintain a viable population of whooping cranes was terminated, resulting in the extinction of the species. Respondents were asked to accept or reject an offer to contribute annually to a trust fund that would purchase land so that the species might be preserved in the future. Each subject responded to a randomly selected dollar amount.</p>	<p><i>Sample Frame:</i> 1984 Wisconsin taxpayers (contributors and noncontributors to WI's existing Endangered Resources Donation Program) <i>Sample Size:</i> ~790 completed surveys <i>Response Rate:</i> 81% <i>Survey Mode:</i> Mail <i>Payment Vehicle:</i> Donation to a private foundation</p>	<p>\$21.00 - \$65.44 (1983 dollars) Estimated annual household willingness to pay to protect the whooping crane (Bowker and Stoll (1988). \$4.47, \$3.07 (1983 dollars) Estimated mean willingness to pay for an annual permit to visit the refuge with and without the whooping crane, respectively; Stoll and Johnson (1984).</p>

Author	Species and Geographic Area	Key Issues Addressed in Survey	Survey Administration	Range of Values
WILLINGNESS TO PAY STUDIES FOR THREATENED OR ENDANGERED BIRD SPECIES <i>(continued)</i>				
Boyle and Bishop (1987)	<p><i>Species:</i> Bald eagle (Federally listed as endangered in 1978; upgraded to threatened in 1995)</p> <p><i>Geographic Area:</i> Wisconsin</p>	<p>The total economic value (<i>i.e.</i>, particularly non-consumptive use values) Wisconsin residents place on the preservation of the Bald eagles. Respondents were first asked to assume that all existing funding to preserve the eagle is terminated and that without funding no organized effort to preserve the species would exist, thereby leading to species extinction. Respondents were asked whether they would pay to become a member of a foundation that will be able to save the bald eagle. Participants responded to a randomly selected dollar amount.</p>	<p><i>Sample Frame:</i> 1984 Wisconsin taxpayers (contributors and non-contributors to WI's existing Endangered Resources Donation Program)</p> <p><i>Sample Size:</i> ~790 completed surveys</p> <p><i>Response Rate:</i> 81%</p> <p><i>Survey Mode:</i> Mail</p> <p><i>Payment Vehicle:</i> Donation to a private foundation</p>	<p>\$16.14 - \$38.12 (1985 dollars)</p> <p>Lower value indicates one-time mean willingness to pay per taxpayer who had <u>not</u> previously contributed to the State's existing Endangered Resources Donation Program (ERD); high end reflects those that had previously contributed.</p>
Stevens <i>et al.</i> (1991)	<p><i>Species:</i> Bald eagle</p> <p><i>Geographic Area:</i> Massachusetts</p>	<p>Estimates the existence value of the Bald eagle by eliciting willingness to pay for a Massachusetts' restoration program. Respondents received introductory information about the species and were told that budget cuts had eliminated a program designed to aid the recovery of the eagle. Respondents were also told about a hypothetical private trust fund to preserve and protect the species. Without the fund the species would no longer exist in New England, though the creation of the fund did not guarantee survival of the species. Individuals were asked whether they would contribute a certain amount per year over the next five years to underwrite the fund.</p>	<p><i>Sample Frame:</i> Massachusetts households</p> <p><i>Sample Size:</i> ~113 completed surveys</p> <p><i>Response Rate:</i> ~22 percent</p> <p><i>Survey Mode:</i> Mail</p> <p><i>Payment Vehicle:</i> Annual contribution for five years to a private trust fund for management of the species</p>	<p>\$19 (1990 dollars)</p> <p>Annual mean willingness to pay for five year period.</p>
Carson <i>et al.</i> (1994)	<p><i>Species:</i> Bald Eagles Peregrine Falcons</p> <p><i>Geographic Area:</i> California</p>	<p>Interim lost use value (a measure of the compensation due to the public) as a result of PCB and DDT contamination. Respondents were told that injury had occurred to a number of species, including bald eagles and peregrine falcons as a result of contamination. Respondents were told in the baseline the natural recovery of the species would require 15 years. Respondents were given the opportunity to vote for or against a government program financed by a one-time income tax surcharge per household that would guarantee a reduction in the natural recovery time from 15 to 5 years. Respondents were told the program would reduce the level of future injuries occurring during the 15 years of natural recovery.</p>	<p><i>Sample Frame:</i> English-speaking California households</p> <p><i>Sample Size:</i> ~2,800</p> <p><i>Response Rate:</i> 72.6%</p> <p><i>Survey Mode:</i> In-person</p> <p><i>Payment Vehicle:</i> A one-time state tax payment in payment card format (discrete-choice elicitation)</p>	<p>\$55.61 (1994 dollars)</p> <p>Lower bound mean one-time willingness to pay per household to enhance natural recovery of the species (Note this figure also includes the public's willingness to pay to enhance the recovery of two fish species: kelp bass and white croaker).</p>

Author	Species and Geographic Area	Key Issues Addressed in Survey	Survey Administration	Range of Values
WILLINGNESS TO PAY STUDIES FOR THREATENED OR ENDANGERED BIRD SPECIES <i>(continued)</i>				
Kotchen and Reiling (2000)	<p><i>Species:</i> Peregrine falcon</p> <p><i>Geographic Area:</i> Peregrine Falcon range within State of Maine</p>	<p>Non-use value associated with restoring a self-sustaining, breeding population of Peregrine falcons in Maine. Respondents were provided with information about a recovery plan designed to increase the number of resident breeding pairs of falcons in Maine from 8 to 15. Respondents were asked to vote on a hypothetical future referendum to approve a statewide species protection fund to finance the recovery plan. Respondents voted yes/no to dollar amounts associated with a hypothetical one-time tax increase designed to underwrite the fund.</p>	<p><i>Sample Frame:</i> Maine residents over the age of 18 (licensed drivers)</p> <p><i>Sample Size:</i> 292 completed surveys</p> <p><i>Response Rate:</i> ~ 63.1%</p> <p><i>Survey Mode:</i> Mail survey</p> <p><i>Payment Vehicle:</i> One-time tax to underwrite a trust fund</p>	<p>\$26 (1997 dollars)</p> <p>Estimated mean willingness to pay for one-time tax increase.</p>
Jakobsson and Dragun (2001)	<p><i>Species:</i> Leadbeater's possum All flora and fauna in Victoria, Australia</p> <p><i>Geographic area:</i> Victoria, Australia</p>	<p>Total economic value of Leadbeater's possum and for all of the flora and fauna in Victoria, Australia. Willingness to pay includes use (wildlife viewing) and non-use value. In the possum case, respondents were asked to accept or reject a dichotomous choice bid amount to determine willingness to pay to protect the species using different payment vehicles on two versions of the survey. A third version addressed willingness to accept compensation for species loss. Because only 11 percent of those surveyed accepted compensation for loss of the species, those results were not reported.</p>	<p><i>Sample Frame:</i> Adult electoral population of Victoria, Australia</p> <p><i>Sample Size:</i> ~1,290 responses</p> <p><i>Response Rate:</i> ~33 percent usable responses</p> <p><i>Survey Mode:</i> Mail survey</p> <p><i>Payment Vehicle:</i> State tax increase Contribution to private trust fund</p>	<p>\$29.18 - \$75.55 (tax payment) \$0 - \$36.45 (trust fund) (Year not reported)</p> <p>Mean annual willingness to pay to protect the Leadbeater's possum.</p>
White, Bennett and Hayes (2001)	<p><i>Species:</i> Red Squirrel Brown Hare Otter Water Vole</p> <p><i>Geographic area:</i> Great Britain</p>	<p>Total economic value of each of two species and of the four species combined. Respondents were asked to accept or reject a dichotomous choice bid amount to determine willingness to pay to implement a Biodiversity Action Plan maintaining red squirrel, brown hare, and combine otter, water vole, red squirrel and brown hare populations throughout Great Britain. Separate surveys were administered for the hare, squirrel, and four species scenarios. Previous results for otter, water vole and two species are reported in U.S. dollars (White <i>et al.</i> 1997).</p>	<p><i>Sample Frame:</i> Population of county of North Yorkshire, England</p> <p><i>Sample Size:</i> 150 responses for Brown Hare 150 responses for Red Squirrel 150 responses for 4 species combined</p> <p><i>Response Rate:</i> 52.2 percent</p> <p><i>Survey Mode:</i> Telephone survey</p> <p><i>Payment Vehicle:</i> Lump sum tax increase</p>	<p>\$ 0 Brown Hare \$ 4 Red Squirrel \$ 12 Water Vole \$ 19 Otter \$ 33 Four species (Year not reported)</p> <p>Estimated lump sum willingness to pay to implement a Biodiversity Action Plan leading stated increases in brown hare, red squirrel and four species populations.</p>

Author	Species and Geographic Area	Key Issues Addressed in Survey	Survey Administration	Range of Values
WILLINGNESS TO PAY STUDIES FOR THREATENED OR ENDANGERED SMALL TO MID-SIZED MAMMAL SPECIES <i>(continued)</i>				
White, Gregory, Lindley and Richards (1997) [see also White <i>et al.</i> 2001]	<p><i>Species:</i> Otter Water Vole</p> <p><i>Geographic area:</i> Great Britain</p>	Total economic value of each of two species and of the two species combined. Willingness to pay includes use (wildlife viewing) and non-use value. Respondents were asked to accept or reject a dichotomous choice bid amount to determine willingness to pay to implement a Biodiversity Action Plan maintaining otter and water vole populations and improving their distribution throughout Great Britain. Separate surveys were administered for the otter, vole, and two species scenarios.	<p><i>Sample Frame:</i> Population of county of North Yorkshire, England</p> <p><i>Sample Size:</i> 105 responses for Otter 105 responses for Water Vole 105 responses for 2 species combined</p> <p><i>Response Rate:</i> 64 percent</p> <p><i>Survey Mode:</i> Telephone survey</p> <p><i>Payment Vehicle:</i> Lump sum tax increase</p>	<p>£ 7.44 Water Vole £ 11.91 Otter £ 10.92 Two species (Year not reported)</p> <p>Estimated lump sum willingness to pay to implement a Biodiversity Action Plan leading to stated increases in otter, water vole and combined populations.</p>
WILLINGNESS TO PAY STUDIES THAT VALUE THE HABITAT OF THREATENED OR ENDANGERED BIRD SPECIES				
Loomis <i>et al.</i> (1996) [see also Giraud <i>et al.</i> (1999)]	<p><i>Species:</i> Mexican Spotted Owl (Federally listed in 1993)</p> <p><i>Geographic area:</i> Four Corners Region (AZ, CO, NM, UT)</p>	Value of protecting 4.6 million acres of critical habitat units for the Mexican Spotted Owl in the Four Corners Region. Respondents were provided detailed maps of the critical habitat units and background information on the species. Respondents were asked whether their household would contribute a set dollar amount each year to the Mexican Spotted Owl Recovery Trust Fund. The fund was to be used for recovery costs associated with managing critical habitat. Respondents were told that if a majority of households in the U.S. voted to approve the fund, the species would be delisted in 15 years; if a majority voted against the fund, the species was likely to become extinct in 15 years.	<p><i>Sample Frame:</i> Split evenly between households in Four Corners Region and all U.S. Households</p> <p><i>Sample Size:</i> 754 returned surveys</p> <p><i>Response Rate:</i> 54 percent</p> <p><i>Survey Mode:</i> Mail survey</p> <p><i>Payment Vehicle:</i> Annual household payment to Trust Fund</p>	<p>\$101 (1996 dollars)</p> <p>Estimated annual willingness to contribute to a trust fund that provides financing for recovery of the species.</p>

Author	Species and Geographic Area	Key Issues Addressed in Survey	Survey Administration	Range of Values
WILLINGNESS TO PAY STUDIES THAT VALUE THE HABITAT OF THREATENED OR ENDANGERED BIRD SPECIES <i>(continued)</i>				
Swanson (1993)	<p><i>Species:</i> Bald eagle</p> <p><i>Geographic Area:</i> 1,000 acres of the Skagit River Bald Eagle Natural Area in Northwest Washington</p>	<p>Non-consumptive use value associated with Bald eagles in the Skagit River Bald Eagle Natural Area (SRBENA) in Washington State. Visitors to the SRBENA were offered a lifetime membership into a foundation which would buy land and manage the area for protection of bald eagles. Participants stated a maximum willingness to pay (or chose not to pay) for the preservation of a certain population of bald eagles, ranging from 50 to 400 birds.</p>	<p><i>Sample Frame:</i> Visitors to SRBENA</p> <p><i>Sample Size:</i> 747 completed surveys</p> <p><i>Response Rate:</i> 51 percent</p> <p><i>Survey Mode:</i> In-person</p> <p><i>Payment Vehicle:</i> Lifetime membership in a trust fund to ensure continued existence of the species</p>	<p>\$146 - \$241 (1989 dollars)</p> <p>Estimated one-time willingness to pay for a lifetime membership in a private nonprofit organization to protect Bald eagles at SRBENA (range represents alternative analysis of data).</p>
Swanson (1993)	<p><i>Species:</i> Bald eagle</p> <p><i>Geographic Area:</i> 1,000 acres of the Skagit River Bald Eagle Natural Area in Northwest Washington</p>	<p>Non-consumptive use value associated with Bald eagles in the Skagit River Bald Eagle Natural Area (SRBENA) in Washington State. Visitors to the SRBENA were offered a lifetime membership into a foundation which would buy land and manage the area for protection of bald eagles. Participants stated a maximum willingness to pay (or chose not to pay) for the preservation of a certain population of bald eagles, ranging from 50 to 400 birds.</p>	<p><i>Sample Frame:</i> Visitors to SRBENA</p> <p><i>Sample Size:</i> 747 completed surveys</p> <p><i>Response Rate:</i> 51 percent</p> <p><i>Survey Mode:</i> In-person</p> <p><i>Payment Vehicle:</i> Lifetime membership in a trust fund to ensure continued existence of the species</p>	<p>\$146 - \$241 (1989 dollars)</p> <p>Estimated one-time willingness to pay for a lifetime membership in a private nonprofit organization to protect Bald eagles at SRBENA (range represents alternative analysis of data).</p>
Hagen <i>et al.</i> (1992)	<p><i>Species:</i> Northern Spotted Owl (Federally listed in 1990)</p> <p><i>Geographic area:</i> Pacific Northwest</p>	<p>Economic benefits of protecting the spotted owl and associated old growth forest habitat in the Pacific Northwest. Respondents were told that the owl acts as an indicator for the health of various other species found in this forest ecosystem. Respondents were provided background information on the costs (<i>i.e.</i>, higher costs for unemployment compensation) and policies associated with a specific conservation strategy. Respondents were asked to vote yes/no to adopting the conservation policy given specific costs to households in the form of higher taxes and high prices for wood products.</p>	<p><i>Sample Frame:</i> U.S. Households</p> <p><i>Sample Size:</i> 319 completed surveys</p> <p><i>Response Rate:</i> 46 percent</p> <p><i>Survey Mode:</i> Mail survey</p> <p><i>Payment Vehicle:</i> Higher taxes and higher wood-product prices</p>	<p>\$86.32 (1991 dollars)</p> <p>Estimated annual mean household willingness to pay to adopt a conservation strategy to protect the spotted owl (assuming non-respondents have a willingness to pay of \$0).</p>

Author	Species and Geographic Area	Key Issues Addressed in Survey	Survey Administration	Range of Values
WILLINGNESS TO PAY STUDIES THAT VALUE THE HABITAT OF THREATENED OR ENDANGERED BIRD SPECIES <i>(continued)</i>				
Rubin <i>et al.</i> (1991)	<p><i>Species:</i> Northern Spotted Owl (Federally listed in 1990)</p> <p><i>Geographic area:</i> Pacific Northwest</p>	Economic benefits of protecting the spotted owl and associated old growth forest habitat in the Pacific Northwest. Survey described spotted owl and its habitat as well as the competing commercial uses for the habitat. Respondents were asked to identify the maximum amount they would be willing to pay per year to be 100 percent certain that the spotted owl would exist in the future. Results for Washington residents were also extrapolated to the West Coast and the nation as a whole.	<p><i>Sample Frame:</i> Washington State residents</p> <p><i>Sample Size:</i> 253 completed surveys (206 used to calculate WTP)</p> <p><i>Response Rate:</i> 23 percent</p> <p><i>Survey Mode:</i> Mail survey</p> <p><i>Payment Vehicle:</i> Hypothetical annual payment per household</p>	<p>\$15, \$20, \$34, \$36 (1987 dollars)</p> <p>Estimated annual mean household willingness to pay to be certain that spotted owl will continue to exist in the future (range of values from high to low include residents of Oregon, Washington State, California, and the rest of the U.S.).</p>
Loomis and Gonzalez-Caban (1988)	<p><i>Species:</i> Northern Spotted Owl (Federally listed in 1990) California Spotted Owl (Petition for listing in April 2000)</p> <p><i>Geographic area:</i> Pacific Northwest</p>	Economic value of protecting spotted owl habitat of old growth forests from fire in California and Oregon. Participants reviewed information on a hypothetical fire prevention and control program that would reduce the amount of old growth forests that burned each year by 20 percent. Respondents were told that insufficient funds existed to achieve this level of fire protection and were asked to vote yes/no on whether they would pay a certain amount each year to help pay for the program. Willingness to pay response were a function of the hypothetical acreage to be protected.	<p><i>Sample Frame:</i> California and New England households</p> <p><i>Sample Size:</i> 672 completed surveys</p> <p><i>Response Rate:</i> ~46 percent</p> <p><i>Survey Mode:</i> Mail and subsequent telephone interview</p> <p><i>Payment Vehicle:</i> Hypothetical annual payment to fund fire prevention program.</p>	<p>\$56 (1995 dollars)</p> <p>Estimated annual median willingness to pay per household for reducing acres burned by the sample average of 2,570 acres. Willingness to pay ranged from \$6 (700 acres) to \$80 (5,000 acres).</p>

Author	Species and Geographic Area	Key Issues Addressed in Survey	Survey Administration	Range of Values
OTHER ECONOMIC VALUATION STUDIES RELATED TO THE CRITICAL HABITAT FOR THE MARIANA FRUIT BAT, GUAM MICRONESIAN KINGFISHER, OR MARIANA CROW				
<p>Shafer <i>et al.</i> (1993)</p>	<p><i>Species:</i> Various species of birds of prey and waterfowl</p> <p><i>Geographic area:</i> Central and Eastern Pennsylvania</p>	<p>Willingness to pay for use values associated with bird watching at two bird sanctuaries in Pennsylvania- Hawk Creek and Middle Creek. Sanctuaries include birds of prey (hawks, falcons, ospreys, eagles, etc) and migratory waterfowl (Canadian Geese, Snow Geese, etc). Uses travel cost method and total expenditures per visitor day for an alternative site – if the interview site was not available on the day of an interview – to estimate additional amount typical visitors would have been willing to pay over and above actual expenditures.</p>	<p><i>Sample Frame:</i> Visitors to sanctuaries</p> <p><i>Sample Size:</i> 229 at Hawk Creek 41 at Middle Creek</p> <p><i>Response Rate:</i> Non-response was negligible at all locations</p> <p><i>Survey Mode:</i> In-person interview</p> <p><i>Payment Vehicle:</i> Added travel costs</p>	<p>\$3 - \$12 (1988 dollars)</p> <p>Estimated willingness to pay for typical visitors to two bird sanctuaries over and above actual spending.</p>
<p>Butler <i>et al.</i> (1994)</p>	<p><i>Species:</i> Various species found at Pelee National Park Canada</p> <p><i>Geographic area:</i> Southwest corner of Ontario, Canada</p>	<p>The net worth of bird-watching at Point Pelee National Park, an internationally renown birding location. Respondents were asked how much their trip related expenditures could rise before deciding not to come birding at Point Pelee. Respondent could answer in terms of actual dollars or as a percentage of their actual trip expenditures.</p>	<p><i>Sample Frame:</i> Visitors to Pelee National park</p> <p><i>Sample Size:</i> 603</p> <p><i>Response Rate:</i> 96 percent</p> <p><i>Survey Mode:</i> In-person interview</p> <p><i>Payment Vehicle:</i> Hypothetical additional trip expenditures</p>	<p>\$256 (1987 Canadian Dollars)</p> <p>Estimated per trip willingness to pay in additional hypothetical trip-related expenditures.</p>

As demonstrated in Table 6-6 estimated values for bird and mammal species' conservation vary widely between studies. The observed differences are a function of such factors as: the good being valued (*e.g.*, continued existence of the species, protection of existing habitat from development or wildfire, the acquisition of new habitat); the payment vehicle (*e.g.*, tax referendum, request for donation to a private fund); the sample frame used for the survey (*e.g.*, refuge or sanctuary visitors, household location, etc.), and the elicitation format (*e.g.*, referenda, double bounded dichotomous choice). Importantly, in some cases the reported values reflect actions to preserve more than one bird or mammal species. Of those most applicable to the Guam Micronesian kingfisher and Mariana fruit bat species, studies investigate the red-cockaded woodpecker native to the south central and southeastern United States⁹³ and small to mid-sized mammals in Great Britain⁹⁴ and Australia.⁹⁵ These studies provide the most closely applicable willingness to pay values associated with protecting the Guam Micronesian kingfisher, Mariana fruit bat, and Mariana crow. However, the study cases are not sufficiently comparable to the policy cases to consider benefits transfer.

6.6 SUMMARY OF ECONOMIC IMPACTS

For activities affected by the proposed critical habitat in the next 10 years, Table 6-7 summarizes the total section 7-related costs and benefits attributable to the species listings, as well as those that are attributable solely to the proposed designation of critical habitat. As indicated in the table, the estimated total section 7-related cost associated with species listing is \$1,573,605. Of this amount, \$554,375 or 35 percent is estimated to be solely attributable to the designation of critical habitat.

Guam

The estimated total section 7-related cost associated with species listing on Guam is \$1,424,185. Of this amount, \$533,655 or 38 percent is estimated to be solely attributable to the designation of critical habitat. These costs represent only 0.07 percent of the total personal income of Guam in 1999. Indirect costs have not been quantified, but the indirect effect of project delays discussed in Section 6.3 could amount to hundreds of thousands of dollars per project. Specific cost information follows:

- The greatest impact is estimated to occur on Navy projects with \$474,390 or 62 percent of the total section 7 cost of \$770,790 attributable to the designation of critical habitat.
- Approximately \$23,515 or nine percent of the total section 7 cost of \$262,465 is attributable to the designation of critical habitat on Air Force property.

⁹³ Reaves *et al.* 1999. "Does questions format matter? Valuing an endangered species," *Environmental and Resource Economics*.

⁹⁴ White *et al.* 1997. "Economic values of threatened mammals in Britain: A case study of the otter *Lutra lutra* and the water vole *Arvicola terrestris*," *Biological Conservation*.

White *et al.* 2001. "The use of willingness-to-pay approaches in mammal conservation," *Mammal Review*.

⁹⁵ Jakobsson and Dragun. 2001. "The worth of a possum: Valuing species with the contingent valuation method," *Environmental and Resource Economics*.

Table 6-7: Section 7 Costs and Benefits Attributable to Species Listings and Proposed Critical Habitat

(10-year estimates)

Item	Consultation		Project Modification		Consultation + PM			Explanation
	Total	Share to CH	Total	Share to CH	Total	Share to CH	CH Acreage	
DIRECT SECTION 7 -RELATED COSTS								
Guam								
U.S. Navy								
Existing Activities/Projects Approved in Marianas Training EIS/Handbook	\$130,350	\$130,350	\$312,500	\$312,500	\$442,850	\$442,850	19,394 ac	
New Activities/Projects Approved in Marianas Training EIS/Handbook								
Sniper Firing Range	\$1,900	\$1,900	None	None	\$1,900	\$1,900	ne	
Jungle Trail	\$4,180	\$380	None	None	\$4,180	\$380	0.09 ac	
Potential Activities/Projects Not Addressed in Marianas Training EIS/Handbook	\$51,810	\$4,710	\$126,500	\$11,500	\$178,310	\$16,210	8,442 ac	
Potential Activities/Projects Not Covered Above	\$132,550	\$12,050	\$11,000	\$1,000	\$143,550	\$13,050	8,442 ac	
Subtotal - U.S. Navy	\$320,790	\$149,390	\$450,000	\$325,000	\$770,790	\$474,390		
Percentage of Share to CH		46.6%		72.2%		61.5%		
U.S. Air Force								
Potential Activity/Project - On-Base Water Supply Improvements	\$41,690	\$3,790	None	None	\$41,690	\$3,790	unknown	
Potential Activity/Project - MSA Bunker Upgrade	\$3,800	\$0	None	None	\$3,800	\$0	1,650 ac	
Potential Activity/Project - Brown Treesnake Barrier Around the MSA	\$4,180	\$380	None	None	\$4,180	\$380	1,650 ac	
Potential Activity/Project - Weapons Storage Building in the MSA	\$23,650	\$2,150	None	None	\$23,650	\$2,150	1,650 ac	
Other Potential Activities/Projects	\$189,145	\$17,195	None	None	\$189,145	\$17,195	unknown	
Subtotal - U.S. Air Force	\$262,465	\$23,515	\$0	\$0	\$262,465	\$23,515		
Percentage of Share to CH		9.0%				9.0%		

Table 6-7: Section 7 Costs and Benefits Attributable to Species Listings and Proposed Critical Habitat

(10-year estimates)

Item	Consultation		Project Modification		Consultation + PM		CH Acreage	Explanation
	Total	Share to CH	Total	Share to CH	Total	Share to CH		
GovGuam								
Potential Activity/Project - Former FAA Housing Parcel	None	None	None	None	None	None	140 ac	Development on the parcel will not involve Federal permits/funding
Northern Guam Public Land	None	None	None	None	None	None	1416 ac	Until the status of the lands is resolved, no actions that would involve section 7 consultation are anticipated
Southern Guam Public Land	None	None	None	None	None	None	1,355 ac (tentative)	Until the status of the lands is resolved, no actions that would involve section 7 consultation are anticipated
Subtotal - GovGuam	\$0	\$0	\$0	\$0	\$0	\$0		
Percentage of Share to CH		NA		NA		NA		
Private Land								
Potential Activity/Project - Beach-Oriented Recreation for Tourists Northwest of Unit A	\$23,870	\$2,170	\$110,000	\$10,000	\$133,870	\$12,170	40 ac	
Potential Activity/Project - Beach-Oriented Recreation for Tourists Northeast of Unit A	\$52,910	\$4,810	\$155,100	\$14,100	\$208,010	\$18,910	12 ac	
Potential Activity/Project - Eco-Tourism and Adventure Racing in the Southern Part of Unit B	\$25,850	\$2,350	\$23,200	\$2,320	\$49,050	\$4,670	453 ac	
Subtotal - Private Land	\$102,630	\$9,330	\$288,300	\$26,420	\$390,930	\$35,750		
Percentage of Share to CH		9.1%		9.2%		9.1%		
Guam Subtotal	\$685,885	\$182,235	\$738,300	\$351,420	\$1,424,185	\$533,655		
Percentage of Share to CH		26.6%		47.6%		37.5%		
Rota								
CNMI Public Lands								
Potential Activity/Project - Airport Improvements	\$25,850	\$2,350	\$85,800	\$7,800	\$111,650	\$10,150	None	Rota International Airport is physically outside proposed critical habitat

Table 6-7: Section 7 Costs and Benefits Attributable to Species Listings and Proposed Critical Habitat

(10-year estimates)

Item	Consultation		Project Modification		Consultation + PM			Explanation
	Total	Share to CH	Total	Share to CH	Total	Share to CH	CH Acreage	
Potential Activity/Project - Route 100 Improvements	\$7,850	\$7,850	None	None	\$7,850	\$7,850	6 ac	
Potential Activity/Project - Marianas Agupa Golf Course	None	None	None	None	None	None	360 ac	<i>Federal nexus</i> has not been identified, so section 7 consultation is not appropriate
Potential Activity/Project - Solid Waste Landfill	\$29,920	\$2,720	None	None	\$29,920	\$2,720	20 ac	
Potential Activity/Project - Homesteads Program	None	None	None	None	None	None	247 ac	<i>Federal nexus</i> has not been identified, so section 7 consultation is not appropriate
Subtotal - CNMI Public Lands	\$63,620	\$12,920	\$85,800	\$7,800	\$149,420	\$20,720		
Percentage of Share to CH		20.3%		9.1%		13.9%		
Private Lands								
Potential Activity/Project - Activities on Privately Held Agricultural Homesteads	None	None	None	None	None	None	418 ac (currently held)	<i>Federal nexus</i> has not been identified, so section 7 consultation is not appropriate
Subtotal - Private Land	\$0	\$0	\$0	\$0	\$0	\$0		
Percentage of Share to CH		NA		NA		NA		
Rota Subtotal	\$63,620	\$12,920	\$85,800	\$7,800	\$149,420	\$20,720		
Percentage of Share to CH		20.3%		9.1%		13.9%		
INDIRECT COSTS								
Guam								
U.S. Navy								
Natural Resources Management	ne	ne	ne	ne	ne	ne		Unquantified changes in budgeting and the relationship between the Navy and the Service Non quantifiable changes in training activities that lead to inefficient training or more expensive alternative sites
Military Training	ne	ne	ne	ne	ne	ne		
Subtotal - U.S. Navy	\$0	\$0	\$0	\$0	\$0	\$0		
Percentage of Share to CH		NA		NA		ne		

Table 6-7: Section 7 Costs and Benefits Attributable to Species Listings and Proposed Critical Habitat

(10-year estimates)

Item	Consultation		Project Modification		Consultation + PM		CH Acreage	Explanation
	Total	Share to CH	Total	Share to CH	Total	Share to CH		
U.S. Air Force	ne	ne	ne	ne	ne	ne		Unquantified changes to training activities due to constraints of CH
Subtotal - U.S. Air Force	\$0	\$0	\$0	\$0	\$0	\$0		
Percentage of Share to CH		NA		NA		NA		
GovGuam	None	None	None	None	None	None		
Private Lands	ne	ne	ne	ne	ne	ne		Unquantified increased negative sentiment toward Federal government due to additional Federal control of Guam lands, which could be hundreds of thousands of dollars per project
Guam Subtotal	\$0	\$0	\$0	\$0	\$0	\$0		
Rota								
Additional Coastal Resources Management Office Requirements	ne	ne	ne	ne	ne	ne		Possible increase in the number of Minor Permit projects
Negative Public Reaction to Critical Habitat for the Mariana Crow	ne	ne	ne	ne	ne	ne		Public response to critical habitat may have unquantifiable adverse consequences on the survival of the species
Conflicting Goals of the MPLA with Proposed Critical Habitat	ne	ne	ne	ne	ne	ne		Estimated revenue lost due to anticipated permit requirements is dependent on unquantifiable future development
Rota Subtotal	\$0	\$0	\$0	\$0	\$0	\$0		
DIRECT BENEFITS								
Species-Specific Benefits Associated with Ecosystem Change	ne	ne	ne	ne	ne	ne		Use value (such as wildlife viewing opportunities) and species existence value are not quantifiable

Table 6-7: Section 7 Costs and Benefits Attributable to Species Listings and Proposed Critical Habitat

(10-year estimates)

Item	Consultation		Project Modification		Consultation + PM		CH Acreage	Explanation
	Total	Share to CH	Total	Share to CH	Total	Share to CH		
INDIRECT BENEFITS								
Ecosystem-Wide Benefits Associated with Section 7 Implementation	ne	ne	ne	ne	ne	ne		Benefits such as increased recreation, overall ecosystem health, ecosystem preservation, and other benefits are not quantifiable
TOTAL								
Costs Over 10 Years	\$749,505	\$195,155	\$824,100	\$359,220	\$1,573,605	\$554,375		
Percentage of Share to CH		26.0%		43.6%		35.2%		
Benefits Over 10 Years	\$0	\$0	\$0	\$0	\$0	\$0		Difficult to estimate

CH=Critical Habitat NA=Not Applicable ne=not estimated PM=Project Modifications

- No economic impact is identified on GovGuam properties as these lack the *Federal nexus* needed for section 7 consultation.
- Approximately \$35,750 or nine percent of the total section 7 cost of \$390,930 is attributable to critical habitat designation on privately held lands. While these costs are relatively small, any additional economic impact could be substantial for an individual landowner.

Benefits from proposed critical habitat have not been quantified but could occur in the form of direct or species-specific benefits and indirect or ecosystem-wide benefits. Such benefits could include:

- Species preservation and recovery, the primary goal of the Act, as well as other complementary ecological improvements may generate social welfare benefits. However, species-specific benefits can only be realized with the control of the brown treesnake. Without effective reduction and control of the brown treesnake, the Mariana crow, Guam Micronesian kingfisher, and Mariana fruit bat will not be able to survive and no species-specific benefit would occur from proposed critical habitat.
- Indirect benefits of critical habitat designation could include increased recreation, overall ecosystem health, and ecosystem preservation. Additional conservation management activities funded by Federal sources could occur and result in a local increase in revenues and employment.

The development of quantitative estimates associated with the benefits of the proposed designation is impeded by the lack of available studies and information relating to the size and value of beneficial changes that are likely to occur as a result of listing a species or designating critical habitat.

Rota

The estimated total section 7-related cost associated with species listing is \$149,420. Of this amount, \$20,720 or 14 percent is solely attributable to critical habitat designation. These costs represent only 0.4 percent of the total personal income of Rota in 1999. Indirect costs have not been quantified, but the indirect effect of designation, discussed in Section 6.3, could result in adverse impact on the survival of the crow. Specific cost information follows:

- The greatest impact is estimated to occur on projects on CNMI public land where \$20,720 or 14 percent of the total section 7 cost of \$149,420 is attributable to the designation of critical habitat.
- No economic impact is identified on privately owned properties, as these lack the *Federal nexus* needed for section 7 consultation.

Benefits from proposed critical habitat have not been quantified but could occur in the form of direct or species-specific benefits and indirect or ecosystem-wide benefits. Such benefits could include:

- Species preservation and other complementary ecological improvements may generate social welfare benefits.

- Indirect benefits of critical habitat designation could include increased recreation, overall ecosystem health, and ecosystem preservation. Additional conservation management activities funded by Federal sources could occur and result in a local increase in revenues and employment.

The development of quantitative estimates associated with the benefits of the proposed designation is impeded by the lack of available studies and information relating to the size and value of beneficial changes that are likely to occur as a result of listing a species or designating critical habitat.

CHAPTER 7

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